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ARCHIVES OF OPHTHALMOLOGY.

OBSERVATIONS ON EYE WORK WITH THE BRITISH EXPEDITIONARY FORCES IN FRANCE.[1]

By GEORGE S. DERBY, M.D., Boston.

Late Lt.-Col., M. C., U. S. A., and Assistant Consultant in Ophthalmology, A. E. F.

THE present observations are concerned chiefly with the Eye Service of the B. E. F., which the writer had an opportunity to observe during the period of thirteen months—May, 1917, to June, 1918,—when he was attached to U. S. Base Hospital No. 5, which was stationed first at Camiers and then at Boulogne. During the very early months of the war there were a few regular R. A. M. C. officers doing eye work in France. In November, 1914, Col. W. T. Lister was appointed Ophthalmic Consultant to the B. E. F. He took up his station in Boulogne at the end of November, 1914, and began the organization of his Service there. In a general way, the British hospitals may be divided into three lines: First, the front line hospitals (the casualty clearing stations); secondly, the line of more permanent hospitals which stretches itself along the coast of France in the north; and thirdly, the hospitals in England—these latter I do not propose to touch on. The British had an eye center for each of their five armies, and in the case of one army there were two eye centers. These centers were usually attached to a casualty clearing station, and were manned usually by one ophthalmologist, occasionally

[1] Part of paper read by invitation before Section on Ophthalmology, New York Academy of Medicine, March 17, 1919.

more. During quiet times, the ophthalmologist in charge carried on his clinic and did a certain amount of refraction. He treated cases of disease, and, in general, cared for the eye work of the army area. He had a certain number of beds for emergency operations and for those cases where a few days' treatment was likely to enable the man to return to his unit without being sent down to the base. In active periods, he did his best to cover the operative and consulting work of his area. But in times of stress most of the eye cases were sent down to the base, except where the patient had other injuries and could not be evacuated. In very active times, the pressure on the casualty clearing stations was so great that only the more urgent cases could be operated on; there were also many hospitals to be covered in the army area, with the result that a large part of the eye work in the front area was done by the general surgeon. Most of the eye cases uncomplicated by other wounds were, therefore, quickly sent down to the base. As the British territory, especially in the north, was a comparatively narrow strip, the hospitals along the coast in times of pressure acted as casualty clearing stations and evacuated cases quickly to England.

There were three principal eye bases in France—Boulogne, Étaples, and Rouen. Of these, Boulogne was the largest, and it remained the headquarters of Colonel Lister throughout the war. The Boulogne eye base was established at No. 13 Stationary Hospital, one of the earliest hospitals in France, which later changed its name to 83 General. Here there were 132 regular eye beds, including 12 for officers in a separate ward. Extra beds could be obtained at the expense of the other services, if necessary. The arrangements at Étaples and Rouen were essentially the same. In addition to these three principal bases, there were subsidiary bases at Calais and at Havre, which were of less importance, and at which a smaller amount of eye work was done. Besides these five centers, there were various groups of hospitals which were situated more or less distant from an eye base. For each of these groups of hospitals an ophthalmologist was provided. The Boulogne eye base had 132 beds. There was a separate eye operating room and an out-patient department, which was exceedingly important and handled large numbers of

cases, as did also the other two eye centers, Étaples and Rouen, for these three bases were important military centers in France. At Boulogne there were usually six ophthalmologists in attendance—Colonel Lister and his understudy and right-hand man, Major J. F. Cunningham, Captains Goulden and Whiting who did most of the operating for the eye clinic and looked after most of the ward work, and in addition there were usually two extra men who worked in the out-patient clinic. Colonel Lister made periodic visits to the other eye centers, and was on call throughout the B. E. F. At Étaples and Rouen each, there were usually three eye men.

Each of the three primary eye bases in France had an optical unit attached to it which supplied the lenses which were prescribed in the areas which they served. These in turn were supplied by the great army spectacle depot organized in London.

The ophthalmological service in France was run by a minimum number of men. I do not believe that all told there were more than 25 or 30 actually engaged in eye work, if we except the men who looked after the trachoma cases in the alien labor companies. Colonel Lister had great difficulty in getting men for his service.

Much of the eye work seen in France at the base was of the same type as the civilian eye work seen at home. The largest group of cases differing from those seen in civil life was formed by the "gassed cases." In July, 1917, we received our first convoy of cases affected by mustard gas. At this time, it was a new type of gas and no one knew anything about it. Lacrimatory gas, so-called, had only affected the eyes slightly and temporarily. With mustard gas we had respiratory signs and skin burns, and the eyes were affected in 80% of cases. The milder cases showed only a slight injection of the eyes, which cleared up very quickly. In the more severe, the lids were red and swollen and often there were large bullæ. There was intense photophobia and the lids were kept tightly closed. It was often necessary to cocainize the eye and to use lid elevators in making the first examination. There was marked conjunctival and ciliary injection, sometimes chemosis, and occasionally one saw a white œdema of the conjunctiva adjoining the cornea in the area of the palpebral fissure.

The cornea showed lesions of a varying degree, from a roughening of the epithelium to a well-marked band which extended across the palpebral fissure, and which was sometimes so marked that it could almost be distinguished across a wide ward. Corneal ulceration rarely took place and only when secondary infection set in, and a comparatively small number of eyes were lost or damaged. The gassed eye tends toward spontaneous recovery in a greater or less length of time. Proper treatment usually prevented the development of secondary infection.

In the treatment of mustard gas it is important to wash out the eyes as early as possible after the gassing with some mild alkaline solution, such as 1% bicarbonate of soda. Following that, the eye should be kept clean with irrigation with some bland collyrium, boric acid, salt solution, etc. As the affection represents a burn, oily solutions are well borne, and the best of these seemed to be liquid albolene. Theoretically, castor oil should be of value, as it is a vegetable oil and dissolves mustard gas. As a matter of fact, it proved more irritating than did the albolene. For the photophobia and ciliary irritation, atropin should be used to keep the pupil well dilated. In a number of cases a considerable quantity had to be used to accomplish this purpose. The eyes should be well protected from light, but a bandage is not permissible as it dams up the secretion. Secondary infection of the conjunctiva is best treated by some mild antiseptic like argyrol.

Magnet Work.—There was a large Haab magnet at each of the three principal stations in France—Boulogne, Étaples, and Rouen. In addition to this there was a Haab magnet mounted in a car, a so-called "mobile magnet," which it was possible to send from place to place as the occasion required. Magnet cases occurring in the front areas were evacuated to the bases, where the operation was performed. When the patient could not be moved, the mobile magnet was sent for.

Colonel Lister and many of his assistants were strong advocates of the anterior route for the extraction of foreign bodies from the eye. There are certain reasons which make it more advantageous in war cases. In the first place, magnet cases are seen most often when an action is taking place and

there are a great many cases coming into the hospital. In such times it is very often difficult to get an X-ray. In active times the pressure on the X-ray department is tremendous. It is necessary to X-ray practically every surgical case. The localization of a foreign body in the eye requires a considerable amount of time, and to have it done in all but the best organized hospitals may mean a delay of a number of hours, and it is often impossible to hold cases for any considerable length of time in busy periods. Consequently, it not infrequently became necessary to go ahead on cases of suspected intraocular foreign bodies without an X-ray. Over 50% of foreign bodies in the eye in war times are non-magnetic, and it certainly is not desirable to make a scleral incision in a case where the foreign body may prove afterwards to have been non-magnetic. The general policy in the B. E. F. was to extract small foreign bodies through the anterior chamber even if the anterior segment of the eye were normal. Larger foreign bodies could be removed through the wound of entrance or through a fresh incision made in the sclera. Some men felt that they could make a fairly accurate localization of an intraocular foreign body by means of a small magnet placed on the sclera, but this was hardly general. At Boulogne the localization of intraocular foreign bodies by the X-ray was performed according to the McKenzie-Davidson method, but on account of the various difficulties X-ray localization was not used to a very large extent in my experience. Of course, the X-ray was more frequently used when extracting by the posterior route.

The technique of anterior extraction was beautifully carried out. The foreign body was drawn into the lower portion of the anterior chamber with the large magnet. For anterior chamber work a very small magnet made by Weiss and working on a storage battery was used. Corneal section from above was made with a straight keratome. The foreign body was then drawn up to the wound by the magnet tip placed over it on the surface of the cornea. As the foreign body reached the wound the magnet tip dexterously separated the lips of the wound slightly and the foreign body was withdrawn, usually with the retention of a good anterior chamber. Only when the foreign body was entangled behind the iris

have I seen the magnet tip introduced. As I said before, Colonel Lister and his assistants were very strongly in favor of the anterior route wherever it could be used. Unfortunately, we have as yet no statistics as to the results of these cases which were treated in the clinics of France. An attempt to work them up was planned, but was delayed by the German offensive of March, 1918. There were some 400 cases from the Boulogne Clinic available for the investigation. Final statistics should give valuable information as to the relative value of the anterior and posterior routes.

The writer brought over as a part of the eye equipment of Base Hospital No. 5 a small Lancaster magnet weighing about thirty pounds, which was about two thirds as powerful as the ordinary Haab. Colonel Lister was very much interested in this magnet, and set the machinery in action for designing and building some magnets of the same general type for his Service. About a year later, the British had begun to turn out magnets weighing 45 pounds, almost as powerful as the Haab, which they designed to place in some of their casualty clearing stations to be used by the ophthalmologist in charge of the eye center. The war ended before these plans were fully matured. These magnets were especially well designed, as they could work with full efficiency on either the 110-volt or the 220-volt current. Colonel Lister felt very strongly that magnets should only be handled by those thoroughly familiar with their use.

The most frequent operation which is performed in war cases is, of course, enucleation. As a rule, the British performed the Lister scleral frill operation, feeling that this procedure lessened the dangers of meningitis. In a certain number of cases, after a clean enucleation a glass ball was implanted in Tenon's capsule. Quite often one saw destructive lesions in which the eyeball was pretty well torn to pieces, and the removal of all the fragments from the lacerated tissues was a painstaking task. Foreign bodies in the orbit were common, and when the eye could be retained it was felt that the foreign body was best left alone, unless large or causing symptoms. To find a small foreign body in the orbit even with the help of an X-ray is often exceedingly difficult, and even after enucleation it is often not too easy. Through and

through perforation of the eyeball was common, and it was often a nice question of judgment as to whether the foreign body was in the eye or in the orbit. We were often helped in the diagnosis by a definite, if somewhat slight, exophthalmus which was almost invariably present. I call to mind two cases where a small foreign body was protruding from the posterior sclera and yet where there was a definite exophthalmus.

There were frequent cases of laceration of the lids and of the orbital walls and tissues which required painstaking cleaning up and repair. In my experience, the British seldom used the conjunctival flap to cover ocular wounds.

Metastatic infections of the eye and more rarely of the orbit were occasionally seen. Curiously enough, all the cases which came under my observation originated from septic wounds of the femur with compound fracture.

As our hospital had a very strong group of brain surgeons, with Colonel Harvey Cushing at the head, we had a large number of head cases referred to us. A large number of these were examined ophthalmoscopically at varying periods of time after the injury, and in a very small number was an outspoken optic neuritis present. In a considerable number there was blurring of the disk margins, hyperæmia, and absence of the physiological cup; but as all these appearances may be present in a normal individual, it is exceedingly difficult to say what should be and what should not be regarded as pathological. A number of interesting fields were seen following injuries to the occipital lobe, hemianopsias, and homonymous quadrant defects with the interesting homonymous scotomata which have been so fully described by Marie and by Chatelin, also by Lister and Gordon Holmes.

One saw a large variety of all types of concussion injuries, a number of cases of hole in the macula, and a few cases of evulsion of the optic nerve. Neuropathic disease of the eye, usually a superficial punctate or a dendritic keratitis, was extraordinarily common.

Practically no plastic work was done in the B. E. F., as the cases were held too short a length of time.

The out-patient clinic was a very busy place, and large numbers of cases were handled there, as Boulogne was an

exceedingly important military base. Much of the work done there was of the sort that the men at home are familiar with, except that with the British it was the fourth year of the war and England was being combed for men of all kinds, the result being that we ran across an abnormal number of disabilities.

At the time I was working with Colonel Lister there was almost an epidemic of night blindness in the British Army; not a week passed that we did not see a number of men complaining of faulty vision after dark. There were not a few cases of retinitis pigmentosa and choroido-retinal disease. A number of men had corneal scars or high errors of refraction. Others were getting used to going around in the dark for the first time in their lives. A few undoubtedly suffered from true night blindness without discoverable disease in the fundus and with normal fields. Many of these men were neurotics or malingerers. The ordinary tests were unsatisfactory. We gave them a careful examination, and if there was no discoverable defect, the customary procedure was to return them to duty with a note asking that they be put under observation. Very few of these men came back to us.

An interesting and splendidly organized department of the Eye Service in the B. E. F. was the handling of the trachoma problem among the alien labor companies. There were several thousand Egyptians of whom 19% had trachoma, and upwards of 100,000 Chinese 9% of whom were affected. The Egyptians were sent home in 1917. The Chinese were examined at Chinese headquarters by experts, and, as far as the eyes were concerned, were divided into three groups—first, those with clean eyes, the X group; secondly, the conjunctivitis or Y group; and thirdly, the trachomatous or Z group. They were then formed into X, Y, or Z companies of five hundred men each and were sent out, care being taken when possible to send the Y and Z companies to an area where they could be under the care of a medical officer with experience in ophthalmic work. All clean companies were treated with zinc drops as a routine, and appropriate measures were taken for the treatment of the conjunctivitis and trachoma companies. Periodic inspections were carried out. This

work has been described in detail by Major J. F. Cunningham in the *Transactions* of the Ophthalmological Society of the United Kingdom for 1918.

I was very much impressed by the excellence of the eye work done in the B. E. F. Colonel Lister had an exceedingly well-trained staff and the work reached a very high standard. Much of this was due to his own personality and his unfailing zeal.

I do not propose to talk about the organization of the Eye Service in the A. E. F., as that is shortly to be described in a paper by Lt.-Col. Greenwood, Senior Ophthalmic Consultant. There are, however, one or two points which I would like to refer to. In the A. E. F. towards the end of the summer campaign, it became possible to station an ophthalmologist in most of the front line hospitals. This was done by Colonel Greenwood, as it was felt that every man with a wound of the ocular structures should be able to obtain expert advice at the earliest possible moment.

As the result of my experience, I feel strongly that eye work should be done by the specialist. Enucleation is an easy operation, but it is surprising to see how badly it is often done by the general surgeon, and how much tissue is removed which should be left if a proper stump is to be retained. The extensive and thorough débridement of wounds—so urgent in general war surgery—does not apply so stringently in wounds of the face, where the blood supply is good, and yet we saw cases where complete débridement of the eyelids was performed, with the horrible resulting deformities. One cannot too energetically impress the necessity of saving every possible bit of tissue in lacerating wounds of the lids, conjunctiva, and orbit, and the most careful repair of these wounds should be performed as early as possible. Wounds in this region, especially where the nasal cavities are not opened—in contradistinction to wounds of other parts—may be closed with the exception of a small drain in the corner. The packing of the orbit after enucleation, often practiced by the general surgeon after removal of the eyeball, is of course unnecessary. The general surgeon does not realize the necessity of removing every fragment of the shattered eyeball, often a very difficult procedure. In many cases it is quite difficult to decide whether

or not an eyeball should be removed at the primary operation. The earlier a foreign body can be removed from the eye, the better is the chance for retaining a certain amount of sight. The criticism of the eye work done by the average general surgeon, according to my experience, applied equally to the B. E. F. and to the A. E. F.

In conclusion, I wish to make my acknowledgments to Colonel Lister, Major Cunningham, and the other members of the Staff for their great kindness toward me and for the many opportunities they gave me of observing and taking part in their work.

EXPERIENCES IN REPARATIVE SURGERY AFTER WAR INJURIES OF THE EYES.[1]

By Dr. GERALD H. GROUT, New York.
LATE CAPTAIN, M. C., U. S. A.

(With fifteen illustrations in the text.)

THE question of late repair work in military surgery is one that will be of interest to the surgeon for some time to come. While it is the intention of the army to have all men return to civilian life in the best possible condition, it is certain that many of them, especially those with eye injuries, will be discharged before the reparative work is completed; leaving the balance to be finished at some of the hospitals in the larger cities. As many of these cases cannot be cured by a single operation, and others have been operated on with no success, the men are certain to be anxious to get home and to choose the time of the second operation rather than remain in some military hospital. As most of this work is elective many of the soldiers will defer the operation until they return and are mustered out of service.

The problem of late restorative work on the eye is fully if not more difficult to solve than that of the earlier period. The operation that was originally performed must be repeated, owing to failure on the first attempt, with the difference, however, that scar tissue has formed, which lends an entirely new phase to the matter. There may be some question as to the reason for the large amount of late repair work; this can be explained by the fact that in most injuries to the body, other

[1] Read before the Section on Ophthalmology, New York Academy of Medicine, March 17, 1919.

than those of the head, there is an extensive débridement of the wound before closure; this to a certain extent insures primary union by removing the dead and infected tissues. In cases of head injuries the débridement is of necessity less extensive and the result is that primary union is not as often obtained as might be desired.

As to injuries received in battle, they do not vary greatly as to variety or extent, as compared with those at some large manufacturing or steel center. The number of cases seen is, of course, greater, and when a few cases of a certain injury are seen within a given period of time, a greater number will be seen at some eye center or base hospital. And going further, when a number of cases of a given type have been operated on by a certain procedure, and favorable results obtained, that method has been followed, modified, or combined with other operations, as necessity called for.

The hospital in which the plastic work is done usually receives its patients from a few weeks to several months after the injury has occurred. In the lighter cases where there has been little loss of tissue and the wound is clean, secondary sutures are taken in order to shorten the convalescence. In the more serious cases where the loss of tissue is marked, infection is present, or bone is involved, the patient is treated until the wound is completely healed before any plastic work is attempted. Usually three months is necessary to produce complete contracture of the scar and cases operated on before that time do not give the best result. As most of the patients are hardy and generally in good condition physically, the operations are usually done under local anæthesia. If the patient is of a nervous type and fears the operation a quarter of a grain of morphine is given subcutaneously one half hour before the operation. The following solution:

Novocain	0.1 *gm.*
Adrenalin (1:1000)	2.0 "
Distilled water	10.0 "

is used to produce local anæsthesia, and as much as 10*cc* of the solution can be injected without producing any unpleasant effect.

It is only seldom that a general anæsthesia is required as most of the work is for cosmetic purposes, and the patients are willing to bear a little pain rather than to suffer from the after effects of the anæsthesia.

The only local preparation that the patient receives before a plastic operation is a painting of the area to be operated on with the tincture of iodine. This is routine and even in cases where a small incision is made the surrounding area for some distance is covered with iodine.

In the postoperative treatment an attempt is made to remove the sutures, that are not sustaining sutures, as soon as possible, in order that the suture openings may close. In

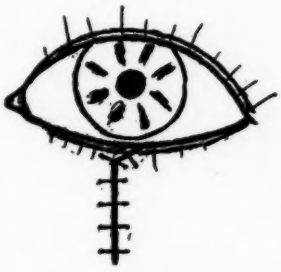


FIG. 1.—Coloboma.

cases where an incision runs across the face every third suture is removed on the third day, on the fourth day every other one, and on the fifth the remainder. When the healing is complete gentle massage is begun in order to increase the mobility of the parts and to help reëstablish circulation in the operated area. This is kept up until all flaps become smooth and pliable and the wound incisions smoothed out.

Coloboma. Probably the most frequent of lid injuries is the coloboma. The repair of a coloboma which is not situated at the extreme ends of the lid offers no great difficulty even if there is considerable scar tissue present. First the edges are freed if adherent; trimmed; the scar tissue removed; and the wound closed. If possible the wound should not enter the intermarginal line at a right angle, but obliquely as indicated in Fig. 1. This increases the chances of a good

result and even if the intermarginal suture fails to hold the notching of the lid margin will be slight.

If the eyeball is in situ, it is well not to cut the intermarginal suture short, but leave the ends about *2cm* long. After a coloboma operation there may be a slight tendency to entropion, and if the intermarginal knot has short ends there is a danger of producing an abrasion of the cornea; with the long ends placed under the dressing the lid is held in a better position and there is less danger of accident. In cases where the ends of the coloboma are adherent to the orbital margin, after freeing and placing them in position a pedunculated fat flap is taken from the cheek and placed over the exposed

FIG. 2.—Coloboma, Blaskovics.

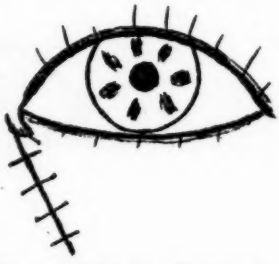


FIG. 3.—Coloboma, Blaskovics.

bone, then the coloboma is sutured. This fat flap prevents the edges of the wound becoming adherent to their old attachment and fills out the cavity formed by the loss of tissue.

A coloboma of the inner canthus presents several difficulties. Usually the lid has been torn away from the attachment and anchored below in an ectropinized position. The result is that even after the lid is freed and brought into position it is not easy to suture it into a position that will produce a satisfactory adhesion. The Blaskovics operation (vide ARCHIVES OF OPHTHALMOLOGY for July, 1918) overcomes this difficulty.

The end of the lid is first freed by outlining the cicatrix and dissecting out all of the scar tissue; if this is thoroughly done the lid can be brought into proper position against the inner canthus. A small skin flap is then formed at the inner angle of the lid, about *5mm* in length (Fig. 2). An incision *4mm* in length is made in the lid parallel to the lid margin

and about 4*mm* from it. The gaping of this wound produces a small triangular defect into which the flap dovetails on suturing the edges of the coloboma together (Fig. 3). By means of this small flap the end of the lid is held in contact with the canthus and even if the first suture fails to hold, this small spur of skin is strong enough to hold the lid in its new position.

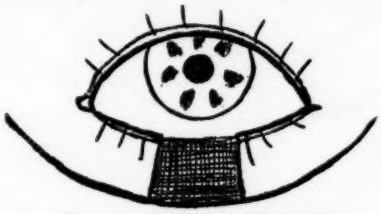


FIG. 4.—Coloboma, Blaskovics.

(Fig. 4.) A second procedure is suitable in cases where the coloboma involves the middle ⅓ of the lower lid and in which there has been some loss of tissue. The first incision is 1*cm* below and parallel to lid margin and extends the entire

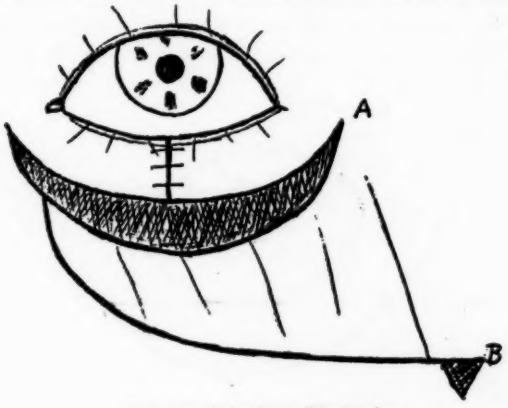


FIG. 5.—Coloboma, Blaskovics.

length of lid. Two incisions at right angles to lid margin are made connecting with the first incision. The scar tissue is excised and the edges of the coloboma are brought together and sutured, leaving a crescentic defect below (Fig. 5). This

defect is covered by making an incision which runs from a point 1.5*cm* to 2*cm* from the inner horn of the crescent down and out on the cheek. A Burows triangle is made at the

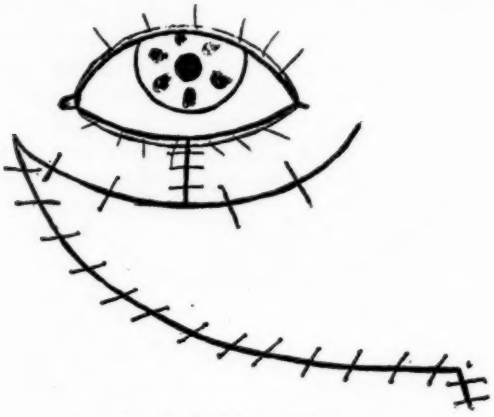


FIG. 6.—Coloboma, Blaskovics.

end of the incision and the pointed flap with subcutaneous fat is then dissected up as far as the line A-B and sutured in its new position (Fig. 6).

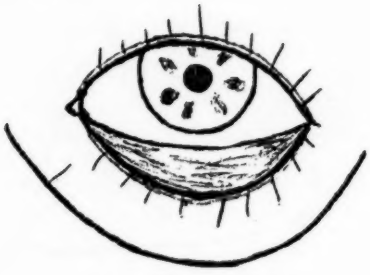


FIG. 7.—Cicat. ectropion.

While this operation was devised primarily for coloboma it developed that it gave good results in cicatricial ectropion (Fig. 7). In these cases after the first incision is made parallel to the lid margin, the skin between the incision and the lid

margin is dissected up and scar tissue removed so that the lid is brought into position against the globe. The second incision begins at the inner end of the defect and runs down onto the cheek, ending in a Burows triangle (Fig. 8).

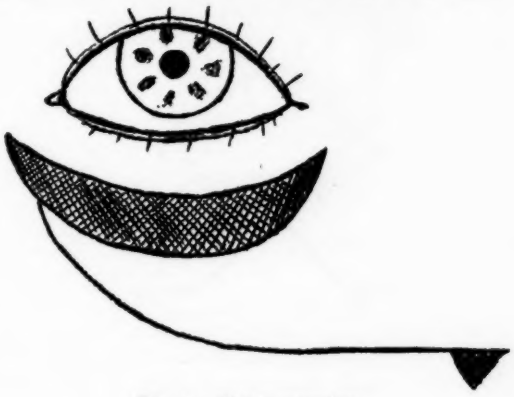


FIG. 8.—Cicat. ectropion.

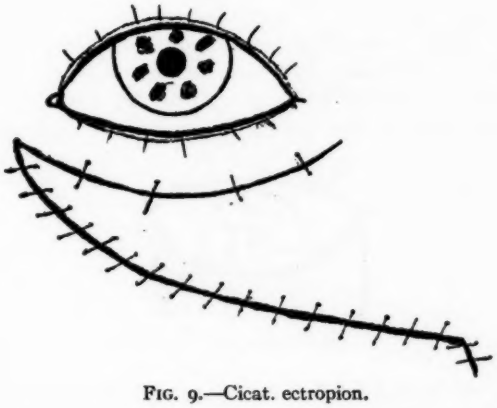


FIG. 9.—Cicat. ectropion.

The flap is then undermined as in the preceding operation and the defect covered by it (Fig. 9). The results from this operation were entirely satisfactory and it was generally employed instead of the Wolfe graft.

In cases where a central coloboma of the upper lid was associated with considerable loss of tissue a Wickeriewicz plastic was performed (Fig. 10). In this operation an in-

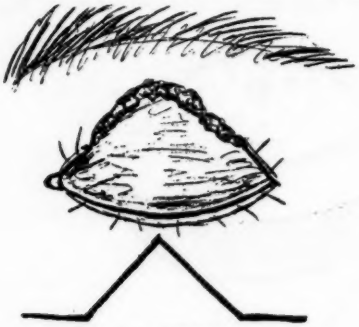


FIG. 10.—Wickeriewicz.

verted V-shaped incision is made through the entire thickness of the lid. The flap is then turned back on the cheek, and two horizontal incisions are made which connect with the base of the flap. The edges of the coloboma are freshened and as much scar tissue removed as possible. The triangular flap is then drawn up into position and its edges sutured to the edges of the coloboma. In this manner the defect in the upper lid is closed by the pedunculated flap from the lower. One week following this operation an incision is made through

FIG. 11.—Landolt.

the base of the flap freeing the upper from the lower lid; the triangular flap by this time forming an integral part of the upper lid. This operation however was only attempted in several instances as the scar formed on the lower lid was so disfiguring that the Landolt plastic was substituted when possible (Fig. 11). In the Landolt plastic when the coloboma

involves the inner third of the lid, its edges are trimmed and an intermarginal incision extending to the outer canthus is made. From here a curved incision extends upward for a

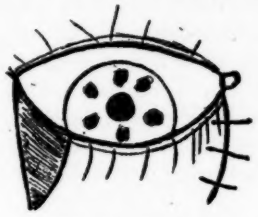


FIG. 12.—Landolt.

distance of 1.5*cm* to 2*cm*. The intermarginal incision is then deepened until the lid is split into two parts. The quadrangular skin flap thus formed is slid over the defect in the lid and sutured into position (Fig. 12). The secondary defect is covered later with a Thiersch graft.

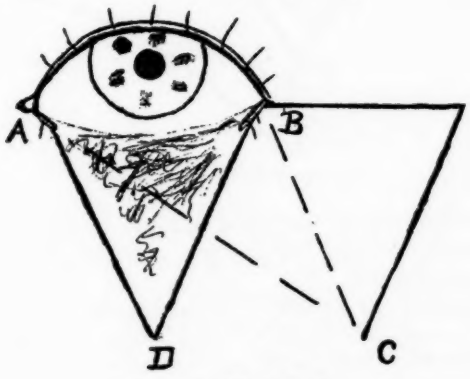


FIG. 13.—Dieffenbach.

The condition which gave the most trouble and where the results were not highly satisfactory was the total loss of the upper lid. Here an attempt was made to produce a new lid by means of a pedunculated flap. A lid was constructed but without musculature. Most of the patients were satisfied if they were able to retain a glass eye in place. This was

accomplished but beyond that not much can be said. The production of a new lower lid was not so difficult and from a cosmetic standpoint more of a success. This was accomplished by means of a pedunculated flap or by a modified Dieffenbach (Fig. 14). One of the defects of the original Dieffenbach operation is that when the flap is sutured in its new position it is on the stretch, that is the line B-C is shorter than line A-C (Fig. 13). This is corrected in the modification of the operation by placing the point C below the midpoint of the lid, the line B-C then being a little longer than the line A-C.

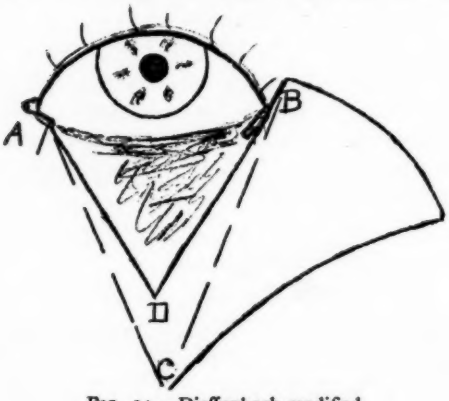


FIG. 14.—Dieffenbach modified.

By this slight change the flap is made to rotate into its new position and to cover the primary defect without being on the stretch (Fig. 15).

Enucleation. In regard to operations on the globe there is little to be said outside of enucleation, as most of the eyes had either been saved or lost before the patient arrived for his plastic work. As to enucleation there are a few points that may be brought out. First in all cases when the globe had not been too badly injured the enucleation was done under local anæsthesia. This was produced by giving three retrobulbar injections of *2cc* novocain-adrenalin solution. The first injection was made through the outer canthus, the second and third at the junction of the inner and middle $\frac{1}{3}$ of each lid respectively. The needle in each case passed through the

skin and was pushed back towards the optic nerve, hugging the globe as closely as possible. One half of the syringeful was injected near the nerve, the syringe was then slightly withdrawn and the balance was injected in an attempt to block the ciliary nerves. If the injection was properly given proptosis followed owing to some of the solution passing into Tenon's capsule. A half hour was allowed to elapse and then the eye was removed; seldom did the patient complain of pain.

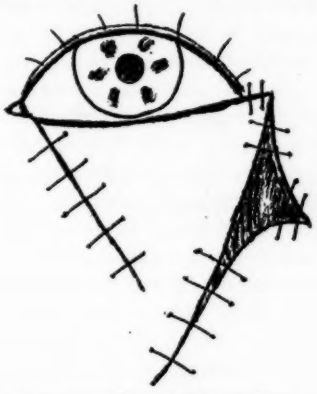


FIG. 15.—Dieffenbach modified.

In cases where the eye had received a severe trauma and ruptured, the enucleation was done under a general anæsthesia. In many instances the globe did not rupture at one but several points, scleral tags being driven into the orbital fat. It sometimes happened that these cases were seen by a medical officer who had had no ophthalmic training, an enucleation was attempted, part of the eye removed, and the patient came back to the base hospital with anophthalmos written on his history. Later on it was discovered that something had been left behind in the orbit; the patient complained of pain, and a second enucleation was started. The conjunctiva was then opened and the shrunken globe grasped and dissected out of its bed. The freeing of the anterior portion of the bulb offered no difficulties but the posterior portion required care. In working toward the optic nerve every snip of the scissors was carefully made. If any resistant tissue was found between the

blades they were not closed near the globe, but were pushed out toward the orbital wall and closed there. This was done in order to avoid cutting some of these scleral tags. In this manner the shrunken stump was encircled and the enucleation completed. Following this a digital examination was made of the orbit to make certain that no foreign body, bone fragments, or scleral tags were left behind. Out of approximately three hundred enucleations no cases of sympathetic ophthalmia were seen; some of the enucleations being performed two years after the injury.

In these late enucleations it is seldom that the conjunctiva can be sutured. Usually a considerable portion has been lost at the time of the injury and that part that is left behind after the complete enucleation is so short that suturing is not attempted. In order to prevent adhesions and contractions, as far as possible, a drainage or reform eye is inserted and worn for some time. This helps to prevent contraction of the socket, and in many cases an operation for restoration of the cul-de-sac is avoided. When this procedure was found necessary Weeks's operation was resorted to. In some of the cases the result was not satisfactory, part or all of the graft failing to adhere; the failures, however, were in orbits where the scar tissue was very dense and a suitable base for the graft could not be obtained. In two cases where the result was negative a permanent blepharorraphy was performed. This can hardly be called a cosmetic operation, but it was not as disfiguring as might be expected as the patients were both badly scarred around the orbit and cheek.

Epithelial Inlay of Esser. In addition to the Wolfe graft implantation, another method of skin grafting has proven successful in cases of retracted lids and that is the method of Esser of Amsterdam, which consists of producing a pocket lined with epithelium. In cases where the lower lid is involved and the fornix is to be deepened a cutaneous incision is made along the orbital margin and carried down to the conjunctiva. All scar tissue is then removed, care being taken not to cut the conjunctiva. The hemorrhage is then checked and a mold is made to fit the cavity out of a dental composition. This mold is then covered with egg albumin and a Thiersch graft pasted on it, the epithelial side against the

mold. It is then buried in the cavity and the skin wound is sutured. At the end of ten days an incision is made through the conjunctiva down to the mold which is removed through the opening. On removing the mold there will be found a cavity which is lined with epithelium. A prothesis is immediately inserted into the cavity to prevent the adhesion of the wound edges and to retain the shape and size of the cavity. In this manner the fornix is deepened by means of this epithelial cavity or inlay.

Epithelial Outlay of Gilles. Gilles of London on the basis of this method of skin grafting developed what he calls an epithelial outlay, in contradistinction to Esser's inlay, as a procedure for the correction of cicatricial ectropion. In cases of involvement of the upper lid, an incision is made parallel to the lid margin and 5*mm* behind it. This is deepened until the tarsus is reached, care being taken not to injure the levator. The strands of scar tissue that are present are excised and the edges of the wounds are undermined, especially above, thus allowing the lid margin to descend to its normal level. A mold is then taken of the cavity, which is covered with an epithelial graft as described in the Esser method. This is then placed in the cavity and the skin sutured over it. Following the suturing the ectropion is more pronounced for the time being, *i. e.*, until the mold is removed. Gilles advises against closing the wound too tightly as this prevents the epithelium growing around the wound edge to the epithelial graft. After the tenth day the mold is removed through the original incision and the lid drops to its normal position. The ectropion is cured by operation but it takes some time for the edges of the new epithelial area to smooth out.

A CASE OF ACUTE RETROBULBAR NEURITIS IN A BABY.

By T. HARRISON BUTLER, Birmingham, England.

THE case of retrobulbar neuritis in a baby published in the Archives, January, 1919, by Dr. Schoenberg leads me to record a somewhat similar case.

On January 4, 1919, a boy aged 1 year 5 months was brought to my consulting rooms.

The history is as follows:

The child was perfectly normal till six weeks ago, when he appeared to be feverish and had a slight convulsion. Soon after the mother noticed that the child who could walk began "to fumble about the house" and to be unable to avoid objects. In a few days she concluded that her baby had become blind. Examination showed that the pupils did not react to light, and that the infant could not see. Both disks were pale, but the vessels were normal in size. The disk edges were perfectly sharp. The boy, the first-born, appeared to be thoroughly healthy. His mother had had no miscarriages, and there was nothing suggestive of syphilis in the parents or child.

The primary attack occurred when influenza was prevalent in the town in a virulent form accompanied by many rapidly fatal cases of pneumonia.

A diagnosis was made of optic atrophy secondary to acute retrobulbar neuritis possibly caused by influenza. Congenital blindness, generally due to syphilitic optic atrophy in an infant who had previously enjoyed good sight, has never before come under my notice, and must be rare. Peters, in *Die Erkrankungen des Auges im Kindesalter*, gives little information upon the subject, only suggesting that such conditions are generally early symptoms of disseminated sclerosis.

I am inclined to think that in my case the neuritis was of influenzal origin. During the recent epidemic I have seen several examples of the ravages of influenza upon the eye, among them the following case:

> A man was admitted to the Birmingham Eye Hospital for preliminary iridectomy. He left the institution with a good coloboma, and an eye free from any injection. As soon as he got home he was attacked with a severe variety of influenza, and his eye became violently inflamed. Fourteen days later he reappeared at the hospital with the eye in a state of panophthalmitis and it was removed. Owing to an unfortunate mistake no bacteriological examination was made.

There was no actual evidence that the baby had suffered from influenza, but it is quite possible that the retrobulbar neuritis may have been of this nature. There was no history of any gastrointestinal derangement and the child was bright, active, and healthy.

At the moment of writing, three months from the onset, I have had no news of any return of sight, and I fear that there is now little hope of improvement.

TUBERCULIN IN THE DIAGNOSIS AND TREATMENT OF EYE DISEASES.[1]

By ERVIN TÖRÖK, M.D., New York.

THE first observations of tuberculosis of the eye date from the beginning of the past century, when surgeons, dissecting the bodies of persons who had died from acute miliary tuberculosis, found the choroid containing tubercles.

Jaeger was the first ophthalmologist who, in 1855, by the use of the ophthalmoscope, saw them in living persons. At that time, however, the knowledge of tuberculous affections of the system at large, as well as that of the eyes, was only vague, and the general problem of tuberculosis did not attain any importance in medical science until the wonderful works of Virchow (1865) and, later, those of Langhans, Schüppel, Baumgarten, and others, established the pathology of the disease. A further advancement was made in this subject when in 1868 Willemin discovered that tuberculosis could be transmitted by inoculation to certain animals; and, finally, when in 1882 Robert Koch found the bacillus of tuberculosis.

These investigations and discoveries are those which form the foundation on which our present knowledge on this subject is built.

As in all other subjects of medicine, so in the tuberculous affections of the eye, two points are of the utmost importance from a practical point of view, and these are: the making of a proper diagnosis, and the applying of the treatment which promises the best results; and these are the points which will be dealt with in this paper, based on our clinical experience

[1] Read at meeting of Section on Ophthalmology, New York Academy of Medicine, February 17, 1919.

at the Knapp Memorial Eye Hospital, covering a period of about fourteen years.

In diagnosing a certain eye condition as tuberculous, the following points are usually taken into consideration:

(1) age, (2) previous history, (3) family history, (4) examination of system at large, (5) animal inoculation, (6) demonstration of the presence of the tubercle bacillus, (7) microscopical examination of an excised portion of diseased tissue, (8) tuberculin injections, (9) clinical appearance of the diseased eye.

As to the age of the patient, previous history, and family history, these are important points which have to be taken into consideration when a diagnosis of tuberculosis is made; none of them, however, is such that much reliance can be placed upon it.

It is true that tuberculosis usually occurs among younger individuals; but, on the one hand, an infection with tubercle bacilli may, and quite often does occur in older people; and on the other hand the condition being usually chronic, the patient may come under observation several years after the onset of the disease and often cannot give us the proper information as to the beginning of his trouble. To determine from the appearance of the eye whether the condition is of two or three years' duration, or ten to fifteen, is, in many cases, impossible.

As to tuberculosis of other organs, this also cannot be considered of great importance from a diagnostic standpoint, because if there is tuberculosis somewhere in the body it does not follow that the eye condition is of the same origin; then again, in the greater percentage of undoubtedly tuberculous eye trouble, no tuberculosis of any part of the system at large can be found.

I have in mind the case of a young woman who had tuberculosis of the lungs (she is at Saranac Lake at present) who also showed Wassermann reaction; both eyes were affected by an interstitial keratitis. She gave strongly positive tuberculin reaction to 0.001 T. V. general, with high temperature and the usual general symptoms, but no focal reaction, and whose eye cleared up promptly under anti-luetic treatment.

As to the inoculation into animals: the demonstration of

the presence of the tubercle bacillus, and the microscopical examination of an excised portion of the diseased tissue, these can occasionally be resorted to in cases of eye diseases. It is possible to make such an examination if the lacrimal apparatus, eyelids, conjunctiva, or the sclera is affected. It is possible, also, sometimes on rare occasions, when operative interference is indicated, in cases of affections of the iris. One such case was of scleritis and sclerosing keratitis where a secondary glaucoma developed and an iridectomy had to be performed. In this latter case a pure culture of tubercle bacilli developed from the contents of the anterior chamber.

In cases of corneal affections and also those of the background of the eye, however, these examinations cannot be resorted to. Then again we have to take into consideration that the microscopical findings are not always typical; that inoculations into animals, even in a case of positive tubercular condition, may be negative, if there happened to be too little or no virulent material in the excised tissue; and, finally, that the finding of the tubercle bacillus is in most of the cases a long and tiresome procedure; and that there are the so-called pseudo-tubercle bacilli which resemble the real tubercle bacilli in every respect, so that experienced bacteriologists are unable to distinguish between them.

I wish to refer here to a case published by Axenfeld and Peppmueller, in which there were no bacilli in 120 sections made of a tubercular abscess but bacilli were found in the following sections, and they were found only after the 50th section in an epibulbar tumor which occurred in the same person.

From a practical standpoint, therefore, the most important factors in making the diagnosis of a tubercular affection of the eye are: the clinical appearance of the eye and the tuberculin injections.

The clinical picture of tubercular eye affections is pretty well defined at present, so that there are quite a few conditions which a priori lead us to suspect a tubercular origin. These conditions are well known and it does not seem necessary to go into it further. I only wish to point out that all these conditions are generally characterized by their chronic course, low inflammatory symptoms, and the appearance of small

nodules (tubercles) in the affected tissues. Among these characteristics the nodules are of the most importance, as their presence seems to be considered an almost positive proof of a tubercular affection. They may be present in the beginning of the disease, or they may develop some time during its course, or following a diagnostic injection of tuberculin. They may present themselves on the affected tissues of the eye or on another tissue which is in close connection with the former but not affected. We have had a few very interesting observations on this point.

Take, for instance, one patient who came under observation with a typical interstitial keratitis, and in the seventh week developed scleritic nodules; and, as a contrast, another patient who was admitted to the hospital for diagnostic tuberculin injection. This patient was suffering from a typical scleritis with scleritic nodules and beginning sclerosing keratitis, which later disappeared, and then a typical interstitial keratitis—not a sclerosing keratitis—developed in the eye.

We also had under observation a case of iridocyclitis with no nodules on the iris, which later developed nodules on the sclera; and another case which, in 1913, was treated for an interstitial keratitis, and then returned, in 1915, with an iritis, and later, also developed nodules on the sclera.

All these cases proved to be positively of tubercular origin, showing from a clinical standpoint the importance of the nodules, and also the close relationship between cornea, sclera, and uveal tract, at least as far as tubercular affections were concerned. It seems that the inflammation of all three tissues is usually present in every case of interstitial keratitis, iridocyclitis, or scleritis; the name of the disease being applied according to which tissue seems to be most involved, from a clinical standpoint, at the time of examination. It also appears that the prevalence of inflammatory symptoms may change during the course of the disease: thus, from a clinical standpoint, a scleritis may change into an interstitial keratitis or iridochoroiditis and vice versa; also that a sclerosing keratitis is nothing but a not fully developed interstitial keratitis, which occasionally may develop into a clinically so-called interstitial keratitis. The difference between them may lie in the difference in virulency and severity of infection. The seat of infec-

tion is probably in the uveal tract, an idea expressed and demonstrated by pathological findings by Treacher Collins, in 1907.

Although the presence or temporary appearance of these nodules is highly suggestive of a tubercular affection, their absence does not disprove such an origin. Clinical experiences, as well as animal experiments and pathological examinations of enucleated eyes, have shown that there is a number of conditions which clinically do not appear to have any characteristic tubercular symptoms, except their chronic course, which are of undoubtedly tubercular origin.

I wish to refer here especially to Stock's experiments and investigations. Stock (Graefe's *Archiv für Ophthalm.*, lxvi.) succeeded in developing various forms of eye diseases by injecting tubercle bacilli into the vein of the ear of rabbits. The disease which he found as a result of this injection was, in the greater number of cases, similar to the chronic iridochoroiditis of human eyes, with and without the appearance of nodules. He, however, also observed cases similar to disseminated choroiditis, scleritis, and tuberculosis of the conjunctiva. Finally, Stock also found that in making careful histological examinations of eyes which were enucleated for chronic iridochoroiditis that a great many of these cases were of tubercular origin, although, in vivo, they showed no signs which would have been suggestive of tuberculosis.

So we find that the clinical appearance of the eye is not always reliable in suggesting tuberculosis, and not absolutely reliable in establishing our diagnosis. To confirm our diagnosis, whether the case is clinically suggestive of tuberculosis or not, we resort to tuberculin. There are three methods of using tuberculin for diagnostic purposes: The Calmette or eye reaction; the von Pirquet or cutaneous reaction; and the subcutaneous tuberculin injection. The tuberculin generally used in all three of these methods is Koch's T. V.

The Calmette reaction consists of dropping 1 drop of a 1% solution of T. V. into the conjunctival sac. In case of an active tubercular process in the system, a severe reaction sets in in the eye. This reaction is especially severe if the eye itself is suffering from a tubercular affection, and has, in our experiences as well as the experiences of others, resulted at

times in very severe and irreparable damage to the eye. The use of tuberculin, therefore, in this form, has been absolutely abandoned.

The von Pirquet cutaneous reaction is secured in the same way as in vaccination: by using a 25% solution of T. V. In case of a positive reaction, the skin at the site of the inoculation shows the well-known characteristic changes. This method has been found to produce a highly sensitive, positive reaction, not only in cases of active tubercular processes, but also in old, healed ones. Since there are very few adults who are absolutely free from old tubercular foci somewhere in the body, this reaction is at present almost exclusively used in children. The method, however, only informs us of the presence or absence of a tubercular focus in the body of the patient, but gives us no clue whatsoever as to the location of this focus. The eye condition, in case of a positive reaction, may or may not be of tubercular origin.

Much more reliable and valuable is the subcutaneous injection of T. V.

The subcutaneous method consists in injecting T. V. under the skin. This method is well known and need not be described here. It is absolutely void of danger, at least so far as our experiences go, comprising almost 1000 injections. We use it in preference to the von Pirquet reaction, in every case in which we suspect a tubercular origin, children included. The amount injected is *½mgm*, *1mgm*, and *3mgm* in children; and *1mgm*, *3mgm*, and *5mgm* in adults. If, after *3mgm* in children and *5mgm* in adults have been injected, we do not get a positive reaction, the patient is considered free from tuberculosis.

A positive reaction consists in local, general, and focal reaction.

The local reaction is the one we observe at the site of injection, usually on the arm. The skin at this point becomes, within a rather circumscribed and sharply defined area, red, swollen, hot, and quite sensitive. This change, in our opinion, is more or less equivalent to the von Pirquet cutaneous reaction, and its meaning, in our interpretation is, that there is a tubercular focus somewhere in the system. The intensity of this inflammatory skin reaction may indicate the activity

of the focus, it probably being smaller and less intense if the focus is old and less active and vice versa. A local reaction alone, therefore, in our interpretation means that there is a tubercular focus somewhere in the system; but means nothing as far as the eye is concerned.

The general reaction consists in a rise of temperature, general malaise, headaches, and heaviness of the limbs. The rise of temperature usually occurs within 24 or 48 hours after the injection, and consists of a sudden rise and sudden fall of temperature; it often being subnormal for a while afterwards. The rise of temperature is not as important as the characteristic sudden rise and sudden fall; it should, however, be at least 1°F. The general reaction in our interpretation has approximately the same meaning as the local reaction, *i. e.*, that there is a tubercular focus somewhere in the system.

It is perhaps safe to assume that the smaller the dose of tuberculin, the higher the rise of temperature; and the more pronounced the general malaise, headaches, and other symptoms are—the more active and perhaps larger is the tubercular focus. This reaction, however, as in the case of the local reaction, does not indicate the location of the focus.

The focal reaction always manifests itself by an increase of inflammatory symptoms in the eye; or, occasionally, the appearance of nodules. It is often very difficult to observe, and only the closest observation of the eye will reveal its appearance. This is particularly true in cases of tuberculosis of the conjunctiva and cornea. In diseases of the choroid, retina, or optic nerve, we found it to be of great service in detecting a focal reaction to make a rough sketch of the fundus immediately before the injection is given, and then to compare this with the condition that is present during, or immediately after, the general reaction. Often very slight changes can be detected in this manner which otherwise would surely be overlooked, and a positive focal reaction be considered negative.

This reaction is the most important one, and the only one which, from our experience and according to our interpretation, indicates that the tubercular focus is in the eye; or, in other words, that the eye condition is of tubercular origin. We, therefore, term an eye condition tubercular only if a positive

focal reaction has been observed. There are, however, cases where it is impossible to detect a focal reaction.

Take, for instance, the cases of recurring, juvenile hemorrhages, of which we had one case under observation, where, on account of the hemorrhages the fundus was not visible; or take the case of a young woman, 22 years old, who suffered from an unusual form of acute retrobulbar neuritis. This latter patient, whose case will be published in the near future, has had an acute retrobulbar neuritis in the left eye. She was an inmate of the Neurological Institute, where her system was most thoroughly examined and every test was found negative. She then was transferred to the Knapp Memorial Hospital, where the usual treatment of pilocarpine sweats, K. I., etc., was given. In spite of this treatment, however, the left eye remained blind, and after two or three weeks' treatment she began to complain of dimness and cloudiness in her right eye.

This condition slowly increased and in five or six days resulted in total blindness, with dilated pupil, which did not react to light; and the usual slight neuritic changes in the optic nerve. A tuberculin injection was now given, and to *3mgm* we obtained a marked general and local reaction; but no focal reaction could be observed. Tuberculin treatment was then commenced, under which she slowly recovered; regaining $\frac{10}{10}$ vision in each eye. It is now two years since the treatment was discontinued and she is still perfectly well, having had no relapses.

Now in cases like both of these, where we get a general and local reaction but for one reason or another no focal reaction can be observed, the diagnosis of tuberculosis cannot be positively established. Our procedure in these cases is to make a most thorough examination of the system at large. If there is no other cause found which would account for the eye trouble, and at the same time no focus found in the body which would explain the positive general and local reaction, we consider the eye condition probably of tubercular origin.

The cases reported here number 100. There are 37 males and 63 females.

The age of patients is as follows:

1 – 10	4
10 – 20	32
20 – 30	32
30 – 40	25
40 – 50	7

As to diseases the cases are divided as follows:

Scleritis and sclerosing keratitis	21
Interstitial keratitis	8
Deep keratitis	9
Chorioretinitis	3
Choroiditis disseminata	4
Exudative choroiditis	11
Iridocyclitis	12
Iridochoroiditis	8
Heterochromic cyclitis	5
Periphlebitis retinæ	11
Detachment of retina	5
Tuberculosis of optic nerve head	1
Tuberculosis of conjunctiva	2

As to the tuberculosis of conjunctiva cases: both of them showed positive focal reactions, and both of them were under observation for several years (6 and 4 respectively). The condition of the eye in both cases was the type closely resembling trachoma. Under tuberculin treatment the follicles disappeared; the pannus has been absorbed and the eyes are now free from inflammation; the conjunctiva is smooth. We observed no relapse in these cases, both of them being under continuous treatment since they came under observation. The treatment during this time was an injection once in 3–4 months.

Eight cases of interstitial keratitis are here reported; they were under observation from 2 to 5 years. All eight cases showed positive focal reaction to tuberculin; three of them had also a positive Wassermann reaction. These latter three cases were first submitted to anti-luetic treatment, and tuberculin was resorted to for diagnostic and therapeutic purposes only after anti-luetic treatment had failed to produce results. All eight have recovered and no relapses have been observed; the treatment lasted from eight to fourteen months.

The deep keratitis cases number nine: all of them showed

a positive focal reaction. They were under observation from 2 to 7 years, with the exception of one who recovered after seven months' treatment, and then the patient disappeared. Of the remaining 8 cases, 7 have recovered; of which 3 have had several relapses. The treatment in these cases lasted from seven months to five years. One patient showed a positive Wassermann reaction; then radium was resorted to but it also did not benefit him. He did not submit to tuberculin treatment.

Of the 21 scleritis and sclerosing keratitis cases, all showed positive focal reaction, and 13 were under observation from 2 to 10 years; 12 of these have recovered; one, although under continuous treatment for over 3 years, has not shown any material benefit from tuberculin. From the above 12 cured cases, 6 have shown relapses within one year or two after the termination of the treatment, which in the various cases lasted from 3 months to 2 years. In these cases a second tuberculin treatment was given, to which all of them responded rapidly, and up to this time no third relapse has been observed, barring one case.

Now 8 of these scleritis and sclerosing keratitis cases have not been seen again since the termination of their treatment, which lasted from two months to a year; 4 of these have recovered and 4 of them have been improved.

The iridocyclitis cases are 12 in number: 10 showed focal reaction to tuberculin; 2 only general and local; 10 were under observation from 3 to 11 years; 2 were not seen since the end of treatment. The tuberculin treatment in the various cases lasted from 9 months to 5 years. Only 2 of the 12 cases have recovered and they did not show relapses; one being under observation for 11 years, and the other for 10 years.

Now of the remaining 10 cases: 5 showed no benefit from tuberculin and 5 have improved. Both cases that showed no focal reaction did not benefit from tuberculin.

We had under treatment for a period of from 6 months to 4 years, 8 cases of iridochoroiditis: 4 of them showed focal reaction and 4 only general and local. The observation lasted from 3 to 5 years. The 4 cases which showed no focal reaction at the time of the diagnostic injection were not benefited by tuberculin treatment; of the other 4 three showed

improvement and one recovered after 14 months' treatment, and showed no relapse at the time of his examination which took place almost 3 years after the termination of treatment.

The 5 cases of heterochromic cyclitis which are reported here all showed positive focal reaction; one was under treatment for only 3 months, showed improvement, and then disappeared. The remaining 4 were under observation from 3 to 6 years, and were treated with tuberculin from 14 months to 2 years. Now 3 of these have recovered; one showing a slight relapse 2½ years after the end of treatment, which lasted for 14 months. She again recovered after 6 months' treatment and is now well after 4 years. This patient's lens, which in these cases usually becomes cataractous, was removed and $\frac{18}{18}$ vision obtained. The fourth case is interesting, because 8 years previous to the time she came under our observation with heterochromic cyclitis, she came to our hospital suffering from recurring juvenile hemorrhages. She has been under tuberculin treatment for 2 years; her eye shows a great deal of improvement, but is not well as yet.

Of the 3 chorioretinitis cases, we observed focal reaction in 2, and no focal reaction in one. All three were under observation for 4 years; the treatment lasting from 8 months to 2 years; 2 recovered and one showed considerable improvement. No relapses were observed.

The choroiditis disseminata cases which are 4 in number were under observation from 3 to 6 years, and had tuberculin treatment for over 2 years. Focal reaction was observed in 3; 3 have recovered; while the one, where no focal reaction was observed, did not show any change after 2 years' treatment.

We have in this report 11 cases of exudative choroiditis under observation from 2 to 5 years. In 3 cases we observed focal reaction; in 8 no focal reaction was found. Of the 3 cases, where focal reaction was found, one recovered, but is still under treatment, lasting now for 4 years. No relapse has been observed. Another case has also been under treatment for 4 years; here tuberculin has not benefited the eye, as the apparently purely choroidal process spread, and developed into a chronic iridochoroiditis. The third case was under treatment for 8 months, when iridocyclitis, deep keratitis, and secondary glaucoma developed, necessitating enucleation.

Now of the 8 cases which showed no focal reaction 5 had dental infection. These cases were submitted to tuberculin treatment, but at the same time the infected tooth was extracted. All have recovered under this treatment; one showed a relapse which healed up after a second infected tooth was extracted, without any other treatment. In these cases in all probability the tuberculin treatment was superfluous; the origin of the choroideal infection being the teeth.

In the other 3 cases no focus could be detected; 2 of these, after 11 months' and 15 months' tuberculin treatment, have apparently recovered, but have not been seen since the termination of the treatment; the third one was not benefited by 9 months' tuberculin treatment.

All of the 11 periphlebitis retinæ cases showed a positive focal reaction. They were under treatment from 7 months to 3 years, with the exception of one, which, after two months' treatment, has disappeared. All of them recovered and showed no relapse during a period of observation ranging from 3 to 6 years, barring one, which, after 14 months' treatment recovered, and one year later returned with a relapse. He was submitted to another 6 months' treatment, and when last seen, 3 years after the termination of the second treatment, was well. One of the cases was complicated with a detachment of retina; in this case the periphlebitis was cured after 9 months' treatment, but the detachment remained unchanged.

Out of 5 detachment of retina cases, complicated with choroiditis, 4 showed focal reaction, and one only general. They were submitted to tuberculin treatment from 14 months to 2 years; but in no case did we observe any material change in the condition, although we observed these cases from 2 to 4 years.

I also report one case of tuberculosis of the optic nerve head which showed a typical focal reaction and recovered, with an optic atrophy after one year's treatment. He is still under observation and his treatment is still being continued.

As to the treatment in all the cases: tuberculin injections have been used besides the usual local treatment, such as hot applications, atropine, yellow oxide salve, etc.; and in a few

cases where it was necessary, operative interference was also resorted to.

It may be mentioned here that in one case of scleritis and sclerosing keratitis, complicated with iridocyclitis and secondary glaucoma, where tuberculin treatment was used for 3 years with practically no benefit to the patient, marked improvement was obtained in September, 1918, by subconjunctival injections of guaiacol cacodylate, according to the recommendation of Darrier. The tuberculin treatment is being still continued; and at present, 5 months after the guaiacol injections, the eye is doing well—in fact better than it ever did before.

We have used these subconjunctival injections in a few other cases also, with the same gratifying results; but were compelled to discontinue them because it was not obtainable under the present conditions in New York City. It seems to me, however, from our limited experience, that the use of guaiacol, which by many is considered a specific in tuberculosis, is beneficial in tuberculous eye diseases, and it would be worth while to investigate further its healing qualities in these conditions.

Until 1914 we used exclusively for diagnostic, as well as therapeutic purposes, the imported Koch's tuberculin. When this was not obtainable any longer, Mulford's tuberculin was used, and gave us highly satisfactory results. All solutions should be fresh and not over two weeks old, as tuberculin in solution seems to lose its activity after this period. This is especially apparent when it is used for diagnostic purposes; as in some cases where no reaction was obtained when using an old solution, prompt reaction set in from the fresh one.

The method we use for treatment is the following:

The first injection is $\frac{1}{10.000}$ of a *mgm;* the dose is increased by $\frac{1}{10.000}$ of a *mgm* until $\frac{1}{1000}$ of a *mgm* is reached; then it is increased by $\frac{1}{1000}$ until a quantity by $\frac{1}{100}$ is given. Now we increase it by $\frac{1}{100}$ until $\frac{1}{10}$ is reached, and from now on by $\frac{1}{10}$ up to 1*mgm* which is the maximum dose. All general reactions are to be avoided; and if, after an injection, the patient complains of symptoms of a general reaction the same dose is repeated, or, if necessary, even a smaller dose given, until it is

tolerated by him without reaction. The frequency of the injections is regulated partly by the amount given, and partly by the action of tuberculin upon the patient, which, of course, means that it varies with individuals. As a general rule, we give injections twice a week until $\frac{1}{10000}$ of a *mgm* is reached; once a week up to $\frac{1}{100}$; once in two weeks up to $\frac{1}{10}$; and once a month up to 1*mgm*.

As to the length of treatment with tuberculin: no hard and fast rule can be laid down. It, again, depends upon the individual, the general condition of the patient, and the severity, duration, and form of eye disease he is afflicted with. In general it may be said, that it must be continued in all cases for a very long time. By this I do not mean months, but years; as we find that the best results have been obtained with those patients who do not become discouraged or do not discontinue treatment when the eye becomes apparently well, but keep up the treatment, getting an injection every 3 or 4 months, for years.

CONCLUSIONS

1. We consider an eye condition tubercular only when a positive focal reaction has been observed.

2. In cases where, for some reason or other, a positive focal reaction cannot be obtained, but the patient shows a positive general and local reaction, and every other possible cause for the eye condition is, with reasonable certainty, excluded, we consider the case of probable tuberculous origin.

3. For diagnostic and therapeutic purposes, tuberculin should always be used in fresh solution, not over two weeks old.

4. For diagnosis in eye conditions, only the subcutaneous injection is of value. It can be used in children as well as in adults with practically no danger.

5. Tuberculin is a valuable remedy in ophthalmic therapeutics provided it is used in very small doses, in positive tubercular eye affections, *i. e.*, in eye affections where a positive focal reaction was obtained. Used under these conditions there is no danger involved.

6. The treatment should be started with a very small dose — $\frac{1}{10.000}$ *mgm*, increasing it slowly to the maximum dose that

the patient can tolerate, which in no case should exceed 1*mgm.* During treatment all reactions should be avoided.

7. Duration of treatment should be long. Relapses being frequent in those cases where treatment has been discontinued after an apparent cure following treatment of less than 8 months.

8. Best results have been obtained in those cases where treatment was continued for several years, and in which, after the apparent cure, an injection of the maximum dose was given once every 3 or 4 months.

9. Tuberculin is of least value in chronic uveitis cases, with the exception of heterochromic cyclitis; while in the cases of scleritis and periphlebitis retinæ the tuberculin treatment is most satisfactory.

10. Scleritis, deep and interstitial keratitis, and iridocyclitis are closely related to each other and have not a separate entity, but may change from one condition to the other, a clinical observation which is borne out by the pathological findings of Treacher Collins.

11. Exudative choroiditis cases are seldom of tubercular origin, the source of infection often being the teeth.

SUBSTITUTE OPERATIONS FOR EXCISION OF THE EYEBALL.[1]

I. IMPLANTATION OF A METAL BALL IN TENON'S CAPSULE

By Dr. WILLIAM M. SWEET, Philadelphia.

SINCE I began in 1904 to employ the Frost Lang method of the implantation of a metal ball in Tenon's capsule, I have operated in 146 cases in which there was no contra-indication to the operation, with the loss of the ball in four cases. In 1910 I reported forty-eight cases of implantation, with the loss of two balls from infection or cutting out of the central sutures. Of the ninety-eight cases operated on since 1910, one ball was lost from infection, in a case of complete sloughing ulcer of the cornea, and the other in a case of shrunken tender eyeball in a child. In no instance during the past six years has the implanted ball been extruded, and this result is no longer expected. Should, however, the ball come out, I believe that a more movable stump is secured than if the ball had not been implanted.

In the report above referred to I summarized the advantages and contraindications of the operation of implantation of a ball in Tenon's capsule, and since that time I have seen no reason to modify these conclusions:

First: The stump in practically every case gives a more movable artificial eye than ordinarily follows simple excision. In some cases of enucleation in which the muscles have been sutured to the conjunctiva and care exercised to preserve all

[1] Series of papers presented at meeting of Section on Ophthalmology, New York Academy of Medicine, January 20, 1919.

conjunctival tissue, an excellent movable prothesis is secured, but this result is uncertain.

Second: The depression of the tissues immediately beneath the brow and the tendency to enophthalmos of the artificial eye are less marked.

Third: The floor of the orbit after healing is flat, with occasionally a slightly raised portion in the center where the implanted ball projects forward, a condition superior to the deep, furrowed, and often irregular socket which serves for the retention of the secretion that so often follows simple enucleation.

With the exception of eyes with malignant growths and those purulently inflamed, there is no contraindication to the operation of implantation. I do not feel, however, that the insertion of a gold ball after the removal of an atrophic stump is a satisfactory procedure, because all the tissues are shrunken and even a small sphere must exert more pressure upon the orbital tissues than is the case after the removal of a full-sized eyeball. In the latter the capsule contracts and forms a firm envelope around the sphere, and the nerves are retracted beyond the reach of dangerous pressure. In the severe types of traumatic iridocyclitis requiring enucleation, even though the other eye has become irritated, there is, in my opinion, no greater danger of sympathetic ophthalmitis than if ordinary excision was performed without a gold-ball implantation. I believe that should sympathetic ophthalmitis appear, it would have occurred no matter what operative procedure had been followed.

Method of Operation.—The enucleation operation as at present performed is followed, with some slight modifications. In dissecting the conjunctiva from the limbus the usual precautions are taken to preserve all the conjunctival tissue, and to avoid any tearing or cutting into the membrane, which will later cause the formation of cicatricial bands. Each of four straight muscles is picked up on the hook and stitched to the conjunctiva in the normal position or brought forward to the edges of the cut conjunctiva, and is then severed from the globe. After the optic nerve has been cut, the oblique and the remaining tissues are severed, and hemorrhage is stopped by deep pressure in the bottom of the socket with dry sterile

gauze. It is not necessary to wait until the oozing has entirely ceased. After the gold ball is in the capsule the pressure stops all bleeding. The center of the upper border of the cut Tenon's capsule is now grasped with forceps and a suture inserted from without inwards, about 1 or 2*mm* from the edge, and then passed similarly from within outwards through the lower capsule border at a corresponding point. Before the suture is tied, the gold ball, 14*mm* in diameter, which has been sterilized in a gauze sponge, is dropped into the exposed cavity, the suture tied, and one end of the thread cut off. The capsule is raised by the attached suture, a strabismus hook passed along the cut edges to the extreme nasal side of the capsular opening, at which point another suture is inserted bringing the edges of the capsule together. One end of this suture is cut off. Similarly a suture is placed at the extreme opening of the capsule on the temporal side. An assistant grasps the central and one of the peripheral sutures, raises the edges of the cut capsule from the bottom of the orbit, and the operator brings the edges together by interrupted sutures. The central and other peripheral suture raises the other portion of the capsule, which is also sewed together. About eight or ten sutures are needed to close the capsule over the ball. If the capsule in any portion is so thin that the ball shows through, some of the adjoining tissues are brought over by suture to cover in the thinned portion. The conjunctival edges are brought together in the horizontal direction with interrupted sutures. A binocular bandage is applied. At the change of dressing the following day, a monocular dressing is applied, and the patient allowed out of bed.

White silk is used for both the sutures in the capsule and the superficial sutures in the conjunctiva. The imbedded silk sutures have never caused any trouble, and are not removed. At the Wills Hospital, Philadelphia, several of the attending surgeons have employed fine chromisized catgut for the sutures in the capsule with good results.

Size of the Ball.—I have experimented with balls of different sizes, but in recent years have adhered to a ball of 14*mm* in adult cases. As a matter of fact, in some robust individuals with prominent eyes the artificial eye maker has found the protrusion in the center of the socket so great with the 14*mm*

ball that it was impossible to use the reform shell. Since the implanted ball is not intended to be a substitute for the eyeball but acts as a bed upon which the prothesis rests and gives a support for the action of the four recti muscles, there is no gain in employing a ball of a size approximating that of the normal globe. In six of the earlier cases platinum balls were employed with the thought that possibly the gold might be acted upon by the body fluids. It was not possible at that time to secure platinum balls as light in weight as the gold, and scarcity of the metal in recent years has not encouraged further experiments on the part of the maker to turn out a lighter product. I have had no opportunity of examining a gold ball after it has been in the tissues for a long period, but an X-ray plate of a case in which the ball has been in the orbit for twelve years failed to show any erosion of the metal.

Complications.—The reaction after operation is usually no greater than after simple excision, and the patients leave the hospital within a week. Occasionally there is considerable swelling of the conjunctiva and the lids, but this is plainly due to the effusion of blood and serum into the orbital and lid tissues. If the globe is removed promptly after the optic nerve and ciliary vessels are cut, so that free egress of blood is permitted through the conjunctival opening, swelling of the lids is rare. The œdema is also more likely to occur if the speculum is removed before the hemorrhage has stopped. Marked swelling of the lids and conjunctiva protract the convalescence but does not cause loss of the sphere.

In two instances in the early days, when experiments were made with catgut for suturing the capsule, some of the central sutures cut out, allowing the ball to protrude between the edges of the conjunctiva. The wound edges were touched with the mitigated nitrate of silver stick, and repeated every second day. Granulations formed, and the balls were ultimately covered in.

Displacement of the Ball.—In none of the cases has the ball shown an appreciable change of position. The method of tying the ends of the four recti muscles over the ball after the capsule sutures have been inserted appears to favor displacement of the ball, probably from contraction of the tissues and the forcing of the ball obliquely out between the muscles. In

several of the earlier cases, this plan of securing the muscles was tried, but I was unable to determine that it possessed any advantage over the method described above.

Sympathetic Disease.—At the time of the publication of the previous report of the results of operation I had seen only one case in which there was the possibility that the implanted ball had caused irritation of the remaining eye. This patient, a physician, was under treatment at the time the report was made, and a detailed history of the case was given. The man had perfect comfort for three years after the implantation, and had worn a reform eye during that period. The prothesis broke, and after a new one had been worn for a few weeks he found that he was unable to do any close work without pain, congestion of the eyeball, and some lacrimation. There was no tenderness upon pressure on the implanted ball nor did the prothesis cause any perceptible irritation of the socket. Several additional eyes were made without relief, and he then became so apprehensive of sympathetic disease that he asked that the implanted ball be removed. He was in good health, but under heavy strain in connection with the surgical work of a large general hospital connected with a steel works, and was advised to take a rest. He was away from his work for several months. After a few weeks all signs of irritation subsided, and he has been wearing an artificial eye with comfort for many years.

I believe the implantation of a metal sphere into Tenon's capsule to be free from all danger of sympathetic trouble, and I have failed to find the report of a case that could be traced to the operation. In my previous report I analyzed the several cases that were quoted as instances of sympathetic disease following the implantation operation. Two of these were embodied in the report of the Committee on Excision of the Ophthalmological Society of the United Kingdom. The committee in its analysis of the cases stated that in neither instance could the sympathetic disease be caused by the implanted ball. In de Schweinitz's report of seventy-two implantation operations by American operators only one case of sympathetic irritation was reported, and this was shown to be due to a badly fitting shell. In Sattler's case the cut end of the optic nerve was found to be firmly surrounded and im-

bedded in dense cicatricial tissue. Davis's case was one of paraffin implantation. Upon opening the socket it was found that the paraffin ball had escaped from Tenon's capsule, and lodged in a solid mass at the posterior part of the orbit. Upon removal of the paraffin the symptoms disappeared.

Every operator of experience is able to recall cases in which there was good movement of the prothesis and little if any sinking of the tissues beneath the brow after simple enucleation. These cases, I believe, are the exception. In the majority of instances there is a distinct staring appearance that cannot be corrected. With the implantation operation the results are generally satisfactory. A certain degree of movement is always secured, in some individuals greater than in others. In a small proportion of the cases, however, with the same care in technic, there is sinking of the tissues of the upper lid after the lapse of a few months, but probably not the same degree as in simple excision.

As I stated in a previous report, measurements of the degree of rotation of the artificial eye are of limited value, as they depend largely upon the shape and fit of the eye. Even when there is good movement of the conjunctival bed, an improperly fitting eye may give only moderate rotation. Two eyes, both well-fitting and comfortable, may show considerable difference in the degree of rotation. From the shape of the prothesis and the depth of the cul-de-sacs greater rotation is always secured in the vertical than in the horizontal meridian.

II. FAT TRANSPLANTATION INTO TENON'S CAPSULE AFTER ENUCLEATION.

By Dr. A. N. ALLING, New Haven, Conn.

AS far as I am aware the first record of the transplantation of fat into Tenon's capsule after enucleation appeared in a South American Journal about 1901, but the operation was later reported from some of the Continental clinics by Bartel *et al*, and it has been practiced more or less by ophthalmologists since that time. When the procedure was brought to my notice I was inclined to try the transplantation of living tissue instead of employing foreign bodies of glass or metal which had formerly been used, and which were sometimes extruded or became infected and in 1909 I performed the following operation.

The conjunctiva was cut and dissected from about the cornea but before severing the recti muscles, each was caught with a catgut suture. The enucleation then proceeded in the usual manner and a purse-string suture of large size was passed well back around the cut edge of the conjunctiva. After bleeding had stopped a skin incision, about three inches long, was made in the abdominal wall and a mass of fat about the size of the eyeball was excised, quickly carried to the socket, and forced in. The muscles were then tied across the fat mass and the conjunctiva closed over it by the purse-string suture. The wound in the skin was sutured and put under a pressure bandage.

Since that time I have modified the operation in one particular. I no longer suture the muscles over the fat and I cannot see that the motility of the stump is decreased to an appreciable degree, and it certainly simplifies the technic.

The questions which naturally arise are first, whether transplanted tissue like fat, which is of relatively low vitality will become organized under these conditions; and, secondly, whether it will shrink. The answer is that the fat is almost invariably retained without degeneration and that it *does* shrink but never less than one half its original size. In spite of the latter fact a sufficiently large stump permanently remains so that the artificial eye is not sunken and has a considerable amount of motility.

One difficulty which I have encountered is that the conjunctival suture is very likely to give way in the first few days leaving a small area of fat exposed, especially if too much fat is used, but this has always been covered over in a short time. However I now place a few supporting sutures in the conjunctiva across the wound to relieve the tension.

Counterindications against the operation are enucleation for malignant tumor, as well as in eyes which have active infection, and I think also that cases in which there is extreme congestion may not do as well—at least the only case of mine which failed was one of this sort.

I commend this operation to you.

III. IMPLANTATION OF A GLASS BALL WITHIN TENON'S CAPSULE BY VERHOEFF'S METHOD.

By Captain HARVEY J. HOWARD, M.C., Medical Research Laboratory, Hazelhurst Field, Mineola, N. Y.

ABOUT a year or so ago Major Verhoeff abandoned the technic involving the tying or suturing of the four recti muscles in front of a glass ball following enucleation because of the general experience that many of the balls thus implanted either came out or became displaced into a quadrant space between two of the muscles. He accordingly worked out the following technic and the results obtained therefrom have been very gratifying.

The operation is begun in the usual way. As soon as the conjunctiva is freed from the limbus it is separated with the scissors from the underlying Tenon's capsule all around for several millimeters back from the margin. The process of enucleation is then continued but care is exercised not to buttonhole Tenon's capsule. The muscles are all cut at their insertions and allowed to retract as far as they will.

After bleeding has sufficiently stopped, a large glass ball, generally about 18*mm* in diameter, is inserted within Tenon's capsule. By this method a larger ball may be used than when the muscles are sutured in front of it. A double-armed heavy silk thread is used for suturing the capsule. The two needles are put in, three or four millimeters apart, from the inside of and several millimeters back from the margin of Tenon's cup, beginning let us say from the patient's left side. The two needles are then inserted in the same manner successively at three other places in Tenon's capsule, 90° apart, viz.: above, at the right side, and below. Each pair is so inserted that there is no crossing of the thread when the latter is drawn up. If

the double suture has been put in properly there should result at this stage a fairly smooth overlapping of each sector of Tenon's capsule upon the one previously sutured so that finally there are four thicknesses of Tenon's capsule in front of the ball. The two ends of the suture are then brought through the conjunctiva somewhat below the middle line, inserted through a pearl button, and tied. The conjunctiva is then sutured in a horizontal median line with interrupted sutures of finer silk than previously used and of sufficient number to give good opposition. The pearl button prevents the conjunctiva from becoming œdematous and bulging out. It also makes it easier to remove the suture which is done in about a week.

Inasmuch as the glass ball prevents shrinkage of the conjunctiva and the onset of an irritating entropion which often occur following enucleations without implantation, there is no need for haste in requiring the patient to wear an artificial eye. It is Major Verhoeff's custom to permit one to be worn three weeks after operation.

As to results, the three important features of special interest to us are the retention of the glass ball, the motility of the artificial eye, and the proper projection of that eye in the orbit. I admit that it is unscientific to try to build up a strong argument based upon the results of a small number of cases. However, I think it worth while to sum up briefly what the results thus far have been.

There have been performed at the Massachusetts Charitable Eye and Ear Infirmary by six different surgeons during the past year about twenty-five of these implantations. Unfortunately the records of a number of them are incomplete in not differentiating between the muscle method and Tenon's capsule method. After eliminating these I find that there are thirteen cases whose records are complete. The unanimous testimony of the six surgeons is that in no case did the glass ball come out. Obviously it is impossible for a ball implanted by this method to become displaced, for the pressure of Tenon's capsule upon the glass ball is uniform over its surface. On the other hand when the muscles are sutured there are produced distinct lines of pressure tending to force the ball into one of the quadrants. For comparison it is of interest to give the

experience of Lieutenant Dowling, a recent House Surgeon, who states that during his service at the Infirmary he followed twenty cases of implantation which he performed himself or in which he assisted. In ten of the twenty cases the glass ball was held in place by the sutured muscles. Of these three of the balls came out and one became displaced between the muscles and had to be removed. In the other ten the glass ball was implanted within Tenon's capsule by Verhoeff's method. In none of these, he states, did a ball come out or become displaced.

As regards motility of the artificial eye: It has always been conceded that the motility of the eye was more extensive in those cases where the ball was implanted behind the recti muscles than when no ball was used. Suffice it to state that the motility is fully as good when the muscles are allowed to slip back and the ball implanted within Tenon's capsule. In order, however, to put on record what the motility of an artificial eye is under the latter method of implantation I herewith give tropometer (Stevens) readings of one case both of the sound and the artificial eyes. For these readings I am indebted to Major Lancaster, who made them this past week at my request upon a boy seventeen years old whose right eye had been enucleated and upon whom an implantation had been done four months ago by Doctor Burke, the present House Surgeon at the Infirmary in Boston:

	Right Eye (artificial)	*Left Eye*
R	20°	50°
L	12°	50°
Up	18°	40°
Down	22°	40°

An exophthalmometer reading done at the same time showed not over a millimeter of difference in the projection of the eyes from the orbit.

IV. FROM THE STANDPOINT OF THE ARTIFICIAL EYE MAKER.

By Mr. PIERRE GOUGELMANN, New York.

THE initial step toward properly adapting a prothesis in a comparatively recent enucleation is to separate the lids as far as possible, giving the adjuster every opportunity of making a careful observation of the socket—primarily with the object of locating adhesions which in some cases are the cause of considerable annoyance to the patient. Secondly, to photograph, as it were, on the mind, a picture of the socket. This is very important, as an improperly adapted eye will sorely discourage the patients who as a rule are in an extremely nervous condition. The shape of the prothesis varies according to the facial development of the individual, the nasal and temporal bones changing the formation of the socket, which correspondingly affect the shape of the globe inserted. There is also great variation in the shape where the loss has been occasioned by accident, explosion, or by disease, particularly glaucoma. Finally, the loss of eyes among soldiers from shrapnel naturally makes an ugly cavity in the lower lid.

When bone has been removed, a very unusual case results, and it requires some experimenting in blowing a globe which conforms to the socket and gives the eye the correct focal alignment.

In cases where there is a natural stump, a gold ball insertion, or a fat implantation, the shapes are generally alike, varying principally in size. These usually require an eye full on the lower side, quite shallow on the top, and with the iris almost centrally located on the horizontal line.

The patient is usually instructed to wear a temporary eye

for a fortnight. At the second visit, conditions permitting, the permanent eye is made. Employing the shape originally inserted, we note what changes are required either in size or position, bearing in mind that an eye too large is more repulsive than one a trifle too small. Both from the standpoint of the maker and the patient, a smaller eye is more desirable. A large eye is painful and requires an effort to close the lids, and in time will either develop adhesions from pressure or produce an irritation of the lid, necessitating the substitution of a much smaller eye. In extreme cases this causes such a contraction that a plastic operation is required.

Ordinarily, an eye can be comfortably worn for the period of a year; in some cases for a shorter time, in others for a longer period. We have had cases where the individual has worn an eye for twenty years without ever removing it, the socket suffering very little from this harsh treatment. Acid conditions of the system as in rheumatism and anæmia shorten the life of an eye as they cause either a crystalline deposit that makes the eye as rough as a file on the outer surface and causes the unfortunate wearer uninterrupted agony, or as in other cases resulting in a discoloration of the sclera and a consequent lifeless and disagreeable color effect. This latter condition can be remedied to some extent by giving the prothesis a bath in peroxide for a few days. This has the effect of bleaching the eye.

Pronounced adhesions are the cause of great trouble in adapting an eye. There is present in the socket, a fold or cord at the outer canthus, which can be readily seen by having the patient rotate his eye inwardly or lifting the fold of skin at the outer canthus. When this is not too pronounced the prothesis can be so shaped that it will fit around this cord, preventing pressure and relieving the patient of periodical annoyance. These bands may be so pronounced and numerous that it is impossible for the eye maker to obtain satisfactory results, and may be the cause of great disappointment to the patient.

In emaciated cases the cosmetic results are far from satisfactory. This is due presumably to lack of fat tissue in the socket. The result is that an ugly depression will be evident in the upper lid. This is very distressing in cases of young girls. No eye can be made that will fill this vacancy though an eye blown at this particular point will overcome, to a minor

degree, this shortcoming. This will, however, affect the correct alignment of the eye. If an eye is made large at one point to obviate this condition, it will have to be made correspondingly larger at the other end to retain the correct relation to the other eye.

We have identically the same condition in glaucoma. While there is plenty of space, apparently the lids are short (a full eye will be "pop-eyed" in appearance), a very flat eye is the only relief but this does not overcome the depression. In these cases we would welcome any suggestion on the part of the oculist. To all concerned the result has been a disappointment. There may be a way of overcoming this poor cosmetic result by some form of implantation operation.

During the past ten years we have had many cases of foreigners principally from Russia who, due to an accident or from disease in childhood, have lost an eye. For some unaccountable reason, no attempt has ever been made to replace the lost member. The socket as well as that side of the face has perceptibly shrunk. In such cases we start by inserting (sometimes forcibly tying in) an eye about 14*mm* in length to make space, increasing the size at regular periods. By this means of dilatation we have had most successful results.

Where the socket has been mutilated through the use of too large a shell, or where it has been wrongly ground down to fit the cavity leaving a sharp cutting edge instead of being smoothly reduced in size in a flame, here it is sometimes possible to successfully treat the case through dilatation, though in the majority the plastic operation is the only relief.

We marvel at the progress made in these plastic cases. Lime and strong acids so reduce the socket that it is a mere slit like an incision resisting any effort to insert an eye. Formerly it was an assured conclusion that nothing could be done to enlarge the socket. This condition has been entirely changed by the reconstruction of a socket through modern methods, making it possible to insert an eye, thus restoring to the patient an almost natural facial condition. These cases are difficult to fit, the socket being flat at the lower edge and deep on the upper, or vice versa, necessitating a very irregular and peculiar shape. In some of these cases at the outer canthus there is no space whatsoever, the cul-de-sac being so shallow

that it blends with the skin at the temporal side. Nevertheless the results have been most encouraging.

The mobility of the eye can be fairly well determined before the insertion of the prothesis. Have your patient rotate his eye and you can very accurately predict the amount of motion by the muscular movement. The best motion is obtained in a natural fully developed stump, as the shell when successfully adapted can deceive even the most observant oculist. It has, in several cases, successfully defied the "all-seeing" wife for a quarter of a century. Some stumps are too sensitive to permit a capping, but these are negligible in number.

The reform eye is a distinct advantage over the shell, in so much as it does not require as much body, lessening the pressure on the walls of the socket and eliminating entirely the possibility of developing adhesions. Besides, the edges being more rounded off are less irritating. The back of the eye sets more perfectly on the muscles and adds to the mobility. The relief and comfort to the patient are pronounced.

Thus, in a period covering the last twenty-five years, our experience in fitting eyes has shown us that a marked progress has been made in the method of operating in so far as the cosmetic effect on the patient is concerned.

The trouble in the past years has been that the cavity in the upper part of the eye has been so pronounced that it was utterly impossible for the eye maker to give satisfaction to the patient because no prothesis could be made that would extend in that section of the orbit. This gave the eye a sunken appearance as compared to the natural eye.

Where the ball of the eye is almost intact, in other words, a natural stump, no difficulty exists because the mobility of the eye is not interfered with and no apparent depression is visible. Of course the number of these cases is insignificant, but the result is most gratifying to all concerned.

A peculiarity of our experience in cases of enucleation has been that many of the cases show a decided depression, while in others this is absent, and the motion seemingly good. In the latter case good results can be obtained.

A very gratifying result in recent years has been the introduction of the gold or glass ball in the socket. This seemed to have overcome the difficulty mentioned before, and gave the eye

a very natural appearance. Unfortunately this ball sometimes works out, leaving the patient in the unfortunate condition which he would have been in, under an ordinary enucleation. These cases on the whole have not been very numerous. The disadvantage lies in the fact that the ball is so far forward that it is difficult to make a prothesis thin enough to prevent abrasion and consequently wearing out the tissues over the ball. Of course this happens in only a limited number of cases, and in the others this condition is not present.

The fat implantation in the socket seems to contain the perfect solution of the problem as viewed from our standpoint —cosmetic effect.

In these cases it is not necessary to explain to the patient why satisfactory results are impossible, because by this method the eye is restored to its natural contour.

It has been suggested frequently by members of the medical fraternity that a mold of the socket be made and that the artificial eye be made an exact replica of this. This is impracticable because the eye being made by hand and not in a mold, cannot be identically reproduced. So far the cases in which the fat transplantations have been used have always been entirely satisfactory and have left nothing to be desired. The one drawback which possibly cannot be overcome is that the outward and upward motions do not seem to be quite as evident as the inward motion, though we have experimented in many ways by making shapes which were not quite as full on the outer canthus. It appears this has not the desired result in increasing the motion.

One argument against this form of operation, the fat implantation, has been that in time the fat will be absorbed. This, however, is the exception and not the rule, as noted in all cases treated. In the first case of this kind, treated some ten years ago, there has been practically no absorption.

We would gladly welcome any suggestion on the part of the oculists, and feel confident that all concerned would be benefited by consultations and conferences on this matter. In fact, it would be well if oculists were more familiar with the difficulty met by the eye manufacturers in producing satisfactory work, in order that some measure might be discovered whereby these difficulties would be overcome.

KERATITIS PROFUNDA IN BOTH EYES FOLLOWING INOCULATION WITH ANTI-TYPHOID VACCINE. REPORT OF A CASE WITH REMARKS.[1]

By Dr. GEORGE HUSTON BELL, New York.

AMONG the recently recorded sequelæ of anti-typhoid vaccination will be found a few examples of ocular lesions. Although the number of reported cases is very limited, attention may well be drawn to them.

It is important that all pathological phenomena arising in patients immediately or shortly after inoculation should be thoroughly investigated and that every endeavor should be made to determine if the relation between the vaccination and the subsequent lesions is causal or merely incidental.

In this case of mine I have, I think, been able to eliminate syphilis, tuberculosis, the teeth, and the tonsils. The patient had two Wassermanns and a spinal puncture, all of which were negative. He also had three injections of the old tuberculin which were given in increasing doses, without any reaction. The X-ray of his teeth was negative and his tonsils had been enucleated.

This man, married, age 24, came to my clinic at the New York Eye and Ear Infirmary on September 19, 1918, with the following history. When he entered the army he had vision of $\frac{2}{20}$ O. U. Last November he was inoculated twice with anti-typhoid vaccine. The first injection was followed by no untoward complications. One week later he received his second vaccination. The next day he had a chill, headache, malaise, and a rise of temperature. His eyes

[1] This patient was shown to the Section on Ophthalmology at the New York Academy of Medicine, on March 17, 1919.

began to bother him. He suffered greatly from the light and could not keep his eyes open. He experienced great pain in both eyes and his eyelids were swollen. He was treated in the hospital at that time for his eyes for two months. Both eyes became inflamed at about the same time.

Status præsens.—His vision when I first saw him was $\frac{1}{200}$ O. U. He has a deep keratitis O. U. His pupils react to light and the eyes are perfectly quiet. There are some gray opacities in the deep layers of the cornea; seen with the naked eye, the opacities seem uniformly gray, while with the magnifying glass these opacities may be resolved into dots or maculæ; some of these dots seem to be pigmented. The pigment might have come from the uveal tract or from degenerated red corpuscles. In keratitis profunda the participation of the iris is mostly limited to hyperæmia, that is the reason why his pupils react so well to light. This patient has been discharged from the army and now receives a pension from the government every month.

It is interesting to note that all the cases of keratitis that I have seen reported, occurred after the second or third injection of the vaccines, showing an anaphylactic phenomenon caused by the previous action of some toxins or bacteria.

De Lapersonne (1) in a recent report says: "It is common knowledge that owing to imperfect sepsis, severe septic infections may follow the administration of anti-typhoid vaccine." He cites a case of a soldier who, after a second or third injection, suffered from multiple boils, septic pneumonia, metastatic purulent uveitis leading to the loss of one eye. Such complications cannot be attributed to the vaccine per se, and moreover are wholly preventable.

Morax (2) has observed a case of a soldier, age forty-three, who developed herpes of the cornea, following the second injection of the vaccine. Morax also reports another case of paramacular retinal hemorrhage after the second vaccination.

Gloagen (3) of Cherbourg reports three cases of keratitis after anti-typhoid inoculation with vision greatly reduced.

As late as January, 1919, Bussy (4) of Lyon, France, who had charge of the ophthalmic service in a section where 22,000 troops were vaccinated against typhoid, reported that five of the men developed ocular lesions. Bussy advises testing the blood pressure as well as examining the urine before inoculations. One of Bussy's cases had albuminuric retinitis and died

two months later of uræmia. Another one presented severe hemorrhages in both retinæ after vaccination. The three other cases developed herpes and ulceration of the cornea.

I report this interesting case of mine because I consider that all lesions which may occur after anti-typhoid inoculation and which can be regarded as due to it should be recorded. No lesion should be ascribed to the inoculation which does not arise during, or very shortly after, the series of injections, and after a thorough investigation.

This deep keratitis seems to me to be a case of typical anaphylaxis, bacterial in origin. The first injection of the vaccine sensitized the cornea, and the second injection acted as an anaphylactic dose.

BIBLIOGRAPHY.

1. DE LAPERSONNE. "Ocular Symptoms following Inoculation against Typhoid." *Arch. d'ophtal.*, April, 1917.
2. MORAX, V. "Herpes of the Mucous Membranes and of the Cornea following Anti-typhoid Vaccination." *Ann. d'ocul.*, mai, 1916.
3. GLOAGEN. "Three Cases of Palpebro-ocular Herpes following Anti-typhoid Vaccination." *Ann. d'ocul.*, janvier, 1917.
4. BUSSY, of France. "Disturbances in Eyes after Vaccination against Typhoid." *Lyon Medical*, January, 1919, p. 20.

THE EXPERIMENTAL PRODUCTION OF PANOPHTHALMIA BY INFECTION FROM THE BLOOD STREAM.

By PAUL WEGEFORTH, Captain, Medical Corps, U. S. Army.

From the Army Neuro-Surgical Laboratory, Johns Hopkins Medical School, Baltimore, Maryland.

(*With six illustrations on Text-Plate VIII.*)

THE report given here on the experimental production in cats of a panophthalmia after inoculation of the blood stream with a suitable organism may be considered as a corollary to the recent communication from this laboratory—Weed, Wegeforth, Ayer, and Felton (3)—concerning the experimental localization in the meninges of certain blood-stream infections. It was there shown that the withdrawal of cerebrospinal fluid during a suitable experimental septicæmia resulted inevitably in the production of a typical meningitis. The close anatomical and physiological analogies which exist between the structures concerned in the elaboration and drainage of the fluids of the eye and brain have been frequently noted—Henderson (2), Wegeforth and Weed (4). Likewise the great similarity of many of the pathological lesions of the two systems is well known, and a close relationship in the selective action of certain bacteria for these tissues is indicated by the frequency with which panophthalmia is associated with epidemic cerebrospinal meningitis. A consideration of all these circumstances suggested that experimental methods similar to those employed in localizing blood-stream infections in the meninges might be used for producing infections of the eye. Two of these procedures, the release of fluid from the anterior

FIGURE LEGENDS

FIG. 1. Photomicrograph. Filtration angle, of left eye (control) from a cat given intravenously a sublethal dose (0.25*cc* twenty-four hour broth culture) B. aerogenes lactis. The aqueous was not removed after the inoculation. The structures are normal. Hæm.-Eosin X 12.

FIG. 2. Photomicrograph. Filtration angle, of right eye from same cat noted in Fig. 1. The aqueous was removed after the production of the septicæmia. There is exudate in anterior chamber, associated with swelling and infiltration of the iris and sclera. Hæm.-Eosin X 12.

FIG. 3. Photomicrograph. Optic nerves and vessels of eye shown in Fig. 2. There is complete absence of posterior extension along these pathways of the intraocular inflammation. Hæm.-Eosin X 12.

FIGS. 4 and 5. Photomicrographs of two eyes infected with B. aerogenes lactis by withdrawal of aqueous during a septicæmia. The involvement of the anterior portions of the eye in both cats was approximately the same. The retina in one (Fig. 4) was only slightly affected, whereas in the other (Fig. 5) the organ is covered with a thick exudate, the superficial layers are completely destroyed, the deeper zones are disintegrating, and the retinal vessels are surrounded by hemorrhage. Hæm.-Eosin X 70.

FIG. 6. Gross appearance of eyes shown in Figs. 1 and 2. On the left is the infected organ and on the right the normal control. Both taken from the same cat.

To Illustrate Dr. Wegeforth's Article on "The Experimental Production of Panophthalmia by Infection from the Blood Stream."

Fig. 1.

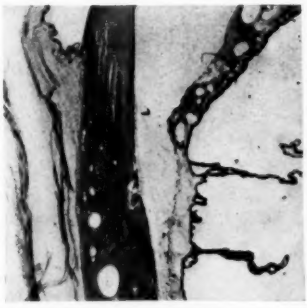
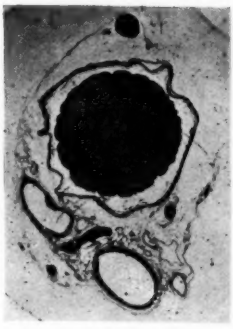


Fig. 2.

Fig. 3.



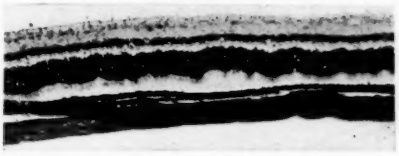


Fig. 4.

Fig. 5.

Fig. 6.

chamber of the eye and the congestion of the cerebral circulation during an experimental septicæmia, have resulted in the production of a purulent panophthalmia.

The microörganism used in these experiments was the B. lactis aerogenes. This bacterium had been used in this laboratory for much of the meningitis work—Felton and Wegeforth (1)—and direct inoculation with it into the anterior chamber of the eye proved that it possessed a marked virulence for this organ also. The most satisfactory method for inducing localization in the meninges of a blood-stream infection was the withdrawal of cerebrospinal fluid either by lumbar or cistern puncture—Wegeforth, Ayer, and Essick (5). An analogous procedure to this, release of aqueous from the anterior chamber, by puncture of the cornea, was adopted for the experiments on the eye. One of the methods then, for producing an ophthalmia secondary to a blood-stream infection consisted in giving the animal a septicæmia with B. lactis aerogenes by intravenous inoculation of sublethal doses of the organism. A few minutes after this inoculation, while the septicæmia was at its height, the aqueous was withdrawn from the anterior chamber of one eye, the other being left intact for control purposes. In performing the puncture of the cornea, the needle, in order to prevent the possibility of direct blood contamination of the anterior chamber, was directed obliquely to the iris, and extreme care was exercised that the point did not come in contact with this membrane.

Two of the four animals used for these experiments developed a severe generalized infection in the eye from which the aqueous had been withdrawn during the septicæmia. In one of these, notwithstanding the precaution taken to prevent injury to vessels by the point of the needle while it was in the anterior chamber, analysis of the aqueous removed showed the presence of a slight blood contamination (200 red cells per cu. mm.). In the other no trace of blood could be seen either in the anterior chamber after the puncture, or in the fluid withdrawn. The protocols of both of these cases are here given.

Cat No. 459. Adult Female.

March 29, 1918: 11.31 A.M.—Ether. Intravenous injection 0.25*cc* of a twenty-four hour broth culture of B.

aerogenes lactis. Two minutes later, 0.5*cc* aqueous removed from anterior chamber of the right eye by puncture of the cornea. Fluid obtained contains no red blood cells. 5 P.M. Anterior chamber filled with fluid; media of both eyes clear.

March 30th.—Media of both eyes clear. Ocular tension the same on both sides. Slight pericorneal redness of right eye.

March 31st.—Media of right eye cloudy and conjunctival redness increased. This eye is very tender. Left eye normal. General condition of animal is good although it is somewhat slow in its movements.

April 1st.—General condition still good. Right eye shows evidence of marked infection, some exudate in the conjunctival sac.

April 2d.—Cloudiness of media of right eye very marked, but the pupil can still be seen. Eye is still very tender, almost closed.

April 4th.—Condition of right eye has gradually become worse. To-day the eyeball is soft and mushy.

The general condition of the cat is still good, but on account of the condition of the eye it was sacrificed.

Gross autopsy.—The right eye is soft and appears to be somewhat larger than the left. There is considerable exudate in the conjunctival sac on the right, where the vessels are very much congested. At the site of puncture there is a small depression in the cornea, suggesting an ulcer, but there is no perforation. The cornea is thick, œdematous, and cloudy. The anterior chamber is filled with a thick, purulent exudate which continues through the pupil into the posterior chamber. Passing backward around the lens and vitreous, this exudate covers the retina in a thin sheet as far back as the fundus. The iris and the ciliary body are thick and injected. The central nervous system and the left eye appear normal.

Microscopic: Right Eye.—Sections were made after removal of the lens, through the antero-posterior axis of the bulb and stained with hæmatoxylin-eosin and toluidin blue. Most of the exudate seen in the gross has been lost during fixation and embedding but there is still a large amount hanging to the entire inner surface of the fluid spaces. *Cornea.*—The fibers are thick but the nuclei are stained well. At the periphery, the vessels of the limbus are congested and there is a marked polymorphonuclear cell infiltration of the tissue. The endothelium lining the posterior surface of the cornea is absent in places; in others it is apparently normal, while in still others the cells are swollen and undergoing degeneration. Descemet's membrane is everywhere in-

tact. The iris and ciliary body are both markedly infiltrated throughout with polymorphonuclear leucocytes. The outer layers of the retina are swollen and disintegrating but their relations are still maintained. The inner layers are completely destroyed, the nervous tissue in this zone being practically confluent with the exudate covering it. The retinal vessels are greatly dilated and in many instances are surrounded by zones of hemorrhages (Fig. 5). At the filtration angle (Fig. 2) the exudate has been held by the trabeculæ in the spaces of Fontana and forms a solid mass. The inflammatory reaction in the sclera is limited to a relatively small amount of cell infiltration in the neighborhood of the vessels between the limbus and the level of the filtration angle. Posterior to this the sclera appears normal. The uvea, posterior to the ciliary body, is apparently normal. Examination of the sections stained with toluidin blue reveal, in the exudate, the presence of numerous bacilli morphologically like B. aerogenes lactis.

Left Eye.—Nothing abnormal was found (Fig. 1). Sections of both optic nerves (Fig. 3) and the optic chiasma were examined, but no evidence of an extension of the infection along these pathways was seen. The central nervous system showed no signs of involvement.

Cat No. 472. Adult Male.

April 2, 1918: 11.40 A.M.—Ether. Intravenous injection of 0.25 cc. of twenty-four hour broth culture, B. aerogenes lactis. Two minutes later 0.75 cc. aqueous removed from anterior chamber of the right eye. The fluid contained two hundred red cells per cu. mm. 5.00 P.M. Anterior chamber of right eye has filled. Media clear.

April 3d.—Media of right eye cloudy, pupil contracted, conjunctiva red. Eye very tender to touch. Left eye normal.

April 4th.—Media cloudy in right; eyeball tender and soft. General condition of animal is good.

April 5th.—Media of right eye very cloudy. Animal is weak and general condition is very poor.

April 8th.—Media in right eye has become increasingly more opaque. The eye is almost closed and the eyeball is extremely tender. The general condition of the animal is very bad, on account of which the cat was sacrificed with ether.

Gross Autopsy.—The right eye is quite soft and appears to be somewhat larger than the left. The iris is entirely obscured by the exudate in the anterior chamber. On section the exudate covers the entire inner surface of the eyeball.

The left eye is normal and the central nervous system shows no gross lesion.

Microscopical.—The same widespread involvement is present in the anterior chamber, iris, and ciliary body. The retina is covered with exudate but all of the layers are in places practically intact (Fig. 4). In others the superficial layer of larger ganglion cells has been invaded and destroyed by the infection. The infection has apparently spread backward from the anterior half of the eye. The tissues of the cornea and sclera are only invaded at the limbus and along the vessels at the level of the filtration angle. Numerous bacilli, morphologically like B. aerogenes lactis can be seen in the slides stained with toluidin blue. The left eye is normal throughout and examination of the optic nerves and optic chiasma do not show an extension of the infection from the right eye posteriorly. The central nervous system is normal.

In the first case there was no recognizable vascular injury during the withdrawal of the fluid from the anterior chamber. The cause of the localization of the infection, therefore, may be attributed to changes in tissue permeability resulting from a lowering of the normal tension of the eye. The infection had progressed too far, in this instance, to permit observations regarding the source of the infection, for all of the structures around the cavity of the bulb were already invaded. The second experiment was unfortunately complicated by a blood contamination at the time of puncture. Otherwise the picture was much the same as that seen in the first case, with the exception that the posterior half of the eye was apparently becoming involved by extension from the anterior half. This would indicate that the origin of the infection was from vessels in either the iris or the ciliary body, although the possibility of a passage of organisms from the scleral sinuses into the filtration angle cannot be excluded.

A third case of panophthalmia (bilateral) occurred during some experimental attempts to produce a meningitis by congesting the cerebral veins during a septicemia. In these experiments, after intravenous inoculation with B. aerogenes lactis, the jugular veins on each side were compressed from one to two minutes. The congestion in the head, resulting from this manipulative procedure caused in 50% of the experiments a localization of the infection in the meninges. One of

the animals, in which this procedure failed to produce a meningitis, developed in the course of a few days an intense infection in both eyeballs. The protocol of the experiment is as follows:

Cat No. 986. Adult Female.

July 24, 1918: 11.32 A.M.—Ether. Intravenous injection 0.5*cc* of a twenty-four-hour broth culture B. aerogenes lactis. Two minutes later both jugulars and the adjacent structures of the neck were compressed with the fingers for one minute.

July 25th.—Animal is a little weak. Retraction of head causes no reaction.

July 26th.—Cat slow and cautious. No evidence of meningitis.

July 27th.—Cat is very cautious in movement, evidently blind. Examination shows in both eyes clouding of media, conjunctival injection, and contraction of the pupils. Both eyes are tender. Bilateral panophthalmia. 11.00 A.M. Ether. Anterior chamber of right eye punctured and 0.75*cc*. of a very thick, greenish-yellow pus obtained, which clotted in about one minute. The fluid contained 24 grams globulin to the liter; the gold sol reaction was 1322235433; the culture was positive for B. aerogenes lactis. A smear of the exudate showed a vast number of white blood cells, mostly polymorphonuclears with a few red blood cells and also numerous bacilli.

July 28th.—Cat is weak and very sick. Marked hemorrhage in the right eye. The right eye is collapsed and the exudate is draining through the opening made in the cornea yesterday. The left eye is soft and its media cloudy. No signs of meningitis.

July 30th.—Corneal defect of right eye has closed and hemorrhage has disappeared. Both eyes soft. General condition poor.

The animal's condition continued to grow worse and on account of this it was sacrificed on August 5th, twelve days after the inoculation.

Gross Autopsy.—Both eyes were reduced to soft mushy balls which on section collapsed. The interior was made up entirely of a thick purulent exudate in which only remnants of normal structures could be made out. The brain and spinal cord appeared normal.

Microscopic.—During fixation and embedding, both eyes folded up like a piece of cloth. The tissues were everywhere destroyed and hardly recognizable. There was no lesion seen in the central nervous system.

The experiments given here, while too few to afford a basis for any definite conclusions, are of interest for several reasons. The microörganism, B. aerogenes lactis, which proved so extremely virulent in the central nervous system, exhibited a similar pathogenicity for the eye. It is striking, however, that in the course of several hundred experiments on meningitis in which this bacterium was inoculated into the blood stream of cats, an ophthalmia was produced only once. In most of the experiments (withdrawal of spinal fluid by lumbar or cistern puncture) where the effects of the experimental procedures were limited to the central nervous system, only a meningitis resulted. In some of the others (compression of the jugulars) similar vascular changes were produced in the eye and the brain, so that a localization of the infection in either brain or eye was effected. When, however, procedures analogous to the withdrawal of spinal fluid were carried out on the eye the infection resulting was limited to the one organ which was operated upon, the opposite eye and the central nervous system being unaffected. Arguing by analogy, the changes produced by the procedure necessary to cause a localization of the infection in both organs are the same. In the brain these are felt to be dependent upon vascular changes brought about when the pressure of the cerebro-spinal fluid is either relatively or absolutely lowered. The experiments on the eye indicate that such a relationship holds in that organ. The close relationship between the withdrawal of aqueous humor during the experimental septicemia and the subsequent development of ophthalmia is indicated.

BIBLIOGRAPHY.

1. FELTON, L. D., and WEGEFORTH, P. "The Production of Experimental Meningitis by Direct Inoculation into the Subarachnoid Space."
2. HENDERSON, T. "Glaucoma." London, 1910.
3. WEED, L. H., WEGEFORTH, P., AYER, J. B., and FELTON, L. D. "The Production of Meningitis by Release of Cerebro-Spinal Fluid During an Experimental Septicemia." *Jour. A. M. A.*, 1919, lxxii., 190.
4. WEGEFORTH, P., and WEED, L. H. "The Analogous Processes of the Cerebral and Ocular Fluids." *Jour. Med. Research*, 1914, xxxi. (N. S. xxvi.), 167.
5. WEGEFORTH, P., AYER, J. B., and ESSICK, C. R. "The Method of Obtaining Cerebro-Spinal Fluid by Puncture of the Cisterna Magna (Cistern Puncture)." *Am. Jour. Med. Sci.*, 1919.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. JOHN M. WHEELER, Secretary.

MONDAY EVENING, DECEMBER 16, 1918. DR. MARTIN COHEN, CHAIRMAN.

Dr. H. H. Tyson presented a case of **traumatic aniridia which followed the extraction with a Haab magnet of a foreign body which was in the lens.** N. L., male, age 29 years, applied for treatment at the Knapp Memorial Eye Clinic on September 24, 1918, with a statement that while hammering a piece of wood two and one half hours previously something struck his right eye and he thought a piece of wood was in it. Examination revealed a shallow anterior chamber with hyphæma, and a wound at the sclerocorneal junction nasally just below the horizontal meridian about 5*mm* long; the iris was cut and a dark object could be seen penetrating into the inferior nasal quadrant of the lens. T−2. Vision R. $\frac{20}{100}$; L. $\frac{20}{20}$. Suspecting the foreign body to be a piece of the hammer an attempt was made to remove it through the original wound of entrance with a Haab magnet, with the usual warning to the patient not to move his head, and to state when he felt any pain or unpleasant feeling in his eye. After several unsuccessful attempts, a final effort was made, during which he gave a groan and suddenly jerked his head backward leaving the foreign body which proved to be a piece of hammer 5*mm* in length with the entire iris hanging upon the tip of the magnet. Recovery was uneventful with vision $\frac{20}{30}$ with correction. Tension and the opacity in the periphery of the lens apparently stationary.

Dr. Chambers said that recently he saw a case of aniridia from injury one year ago, and the eyeball was in good condition.

Dr. CRIGLER thinks it remarkable that Dr. Tyson's case has so little dazzling.

Dr. DIXON said that whenever the X-ray shows a large, jagged foreign body he advises removal through a post-scleral opening to prevent injury to the iris. He thinks all foreign bodies should be skiagraphed to show the size and shape.

Dr. WALTER E. LAMBERT presented a case with a **foreign body in the globe.** The patient, a man about thirty years of age, was struck in the left eye May, 1918. Was first seen by me on October 31, 1918. The left eye appeared perfectly normal, externally; pupil reacted promptly to light; vision with plus 5 combined with plus 2, axis 120, equaled $\frac{20}{100}$. Vision of right eye was $\frac{20}{20}$ with plus 2 combined with plus 2 axis 60. Ophthalmoscopic examination disclosed the presence of a piece of steel in the lower outer quadrant, projecting from the sclera. There were some vitreous opacities and some changes in the choroid. The optic disk was slightly congested. The condition to the present time is practically the same as when first seen; although there may be some slight increase in the optic neuritis. No attempt has been made as yet to remove the foreign body.

Dr. EMERSON said that about three or four years ago he saw a case with foreign body near the nerve head. He made a scleral incision about ¼ the way back. He then inserted a punctum dilator and applied magnetic current. On withdrawing the punctum dilator the foreign body adhered.

Dr. SCHOENBERG suggested enucleation because of the condition of the eye which showed neuritis. He also suggested that a blood count might be significant.

Dr. KNAPP thinks that the eyeball should be removed on account of pigmentation, optic neuritis, siderosis, and he would fear sympathetic ophthalmia.

Dr. ARNOLD KNAPP presented a case of **bilateral subluxation of the lenses with fundus changes.** The patient, C. D., aged 28, has always had poor sight, especially for the last three years. The right eye sees m. h., field contracted to p. f.; the left, $\frac{20}{100}$. On examination, the right eye presents a tremulous iris, the lens is not in place. After dilating the pupil, it is possible to see that it is situated in the bottom of the vitreous chamber and presents the following peculiarities. There is a

well-marked central opacity surrounded by a perfectly clear transparent ring through which the red fundus appears magnified. The eye ground shows an advanced stage of chorioretinitis pigmentosa. In the left eye the lens is dislocated to the temporal side, so that the nasal half of the pupil is free. The eye ground shows absolutely no evidences of inflammation, nor pigmentation, but a staphyloma verum.

The case is presented on account of the two following conditions. First, the curious appearance of the dislocated lens with its clear periphery which, to me, indicates an advanced stage of hypermature cataract, namely, a Morgagnian, in which the periphery has again become clear. Second, the pigmentation in the eye ground of this eye. The case suggests a condition which follows cataract couching.

Colonel Henry Smith in an article on cataract couching (*Transactions*, British Ophthalmological Society, 1904, p. 264), states that in the successful cases of couching at first the eye looks beautiful, but there follows a slow and steadily progressive degeneration of the vitreous and of the retina such as occurs in retinitis pigmentosa sine pigmento. This leaves vision in the least rapid cases very poor at four years after the operation and after a few further years no vision at all. This, in Colonel Smith's experience, is the invariable sequence.

Colonel Elliott, to whom we owe a book on the operation for couching for cataract, which was reviewed in the ARCHIVES, March, 1918, finds that chorioretinitis and retinal pigmentation are present in only between 1 and 2% of the cases. He cannot find any evidences to support the view that the lens in the vitreous brings about retinal changes, though he has found an undue distinctness of the choroidal vessels.

In this case there is a dislocated lens and the fundus shows chorioretinitis pigmentosa while the other eye presents no pigmentary changes. Whether in this case the dislocated lens in the vitreous was the cause for this pigmentary chorioretinitis, or whether the retinitis is just a further stage of the retinal condition which caused the dislocation of the lens, it is difficult to decide.

Dr. WEEKS said that the appearance of the lens was probably explained by the shrinking of the lens substance in the capsule. He said that unilateral retinitis pigmentosa is rare

but not unheard of. He has not observed retinitis pigmentosa in eyes carrying dislocated lenses.

Dr. COHEN presented for Dr. H. W. WOOTTON, a case which had an **unusual appearance of a secondary cataract following extraction of a dislocated lens (traumatic).** Mr. W. G., aged forty-three, gave the following history. In 1900 he was struck over the left eye with a stone causing a subluxation of the lens. The eye remained quiet for several years when there developed a cataract which became mature in 1907. It was then successfully removed, resulting in excellent vision. After two years he again received a severe injury to the same eye by being struck with a window shade, resulting in a severe inflammatory reaction and producing hyphæma and blood in the vitreous, associated with severe pain lasting five weeks. At this time there gradually appeared a whitish membrane in the pupil. The treatment consisted of atropine, hot applications, and rest.

The patient was first seen by Dr. Wootton two weeks ago when he presented the following condition: Right eye normal. Left eye: vision, light perception. Field faulty in every direction. Tension normal. Eye free from any acute inflammatory manifestation. Cornea has a gelatinous appearance, most marked in the lower quadrant. This area shows deep striated opacities permeated with pigment and calcareous plaques. Pupillary space is completely covered by a milky white cyclitic membrane having a sharply defined circular perforation near its nasal border. Iris is atrophied and widely dilated without mydriasis. Pigment proliferation is seen on its surface, also areas of degeneration. Artificial coloboma is seen upward and filled in with the cyclitic exudate.

Major E. S. SHERMAN reported an **extraordinary case of foreign body in the orbit.** J. S., male, age thirty-three, a worker in a steel mill, while testing a pair of heavy knives used for cutting steel, felt something strike his right eye. There was not much pain and he supposed he had been struck by a small chip of steel. A few drops of blood came from the right nostril. He was brought to my office within an hour. There was a small V-shaped wound just above and to the nasal side of the center of the cornea, a laceration of the edge of the iris, and a rent in the anterior capsule of the lens with almost complete lenticular opacity.

When taken to the Newark Eye and Ear Infirmary an hour or two later and placed before the giant magnet there was no response and no pain. The eye could be moved freely and painlessly in all directions except towards the nose; power to rotate the eye inward was almost completely abolished. This condition persisted. As soon as practicable an X-ray examination was made which disclosed a long, slender foreign body extending from a point on, or just outside of the eyeball, and a few millimeters to the nasal side of the posterior pole backwards and to the left, penetrating the posterior ethmoid cells of the right side, crossing the extreme upper part of the nasal cavities, and passing through the left sphenoid sinus to the anterior wall of the pituitary fossa.

As there was considerable iridocyclitis and vision reduced to light perception, the eye was enucleated. The anterior end of the foreign body, about 3 or 4*mm* of which were in the orbit, was easily located in the orbital fat. With a pair of forceps it was easily removed in toto. It was found to be a piece of steel 57*mm* long, nearly straight, and irregularly triangular in form, and about 1½*mm* in diameter. For several days previous to its removal the patient had severe pain about the front of the head at night which ceased with the removal of the foreign body.

Dr. DIXON said that the longest foreign body he had plotted previous to this one was about 21*mm* long.

Dr. J. W. AVERY presented a **specimen of melanosarcoma of the eyeball with microscopical slide of same.**

Major W. B. LANCASTER (by invitation) spoke on the **work at the Medical Research Laboratory with special reference to ophthalmology.**

The work of the Medical Research Laboratory of the Air Service Division of the Surgeon General's office, may be divided into three sections.

First: Classification of Aviators on the basis of the altitude to which they are fitted to fly.

Second: Training of officers:

(a) For work as Flight Surgeons.

(b) For work at branch laboratories.

Third: Research.

The work is organized under seven departments, namely:

Physiology, Psychology, Cardio-vascular, Ophthalmology, Otology, Psychiatry, Physics and Engineering.

The Department of Ophthalmology was organized by Colonel Wilmer. In August he took the greater part of the Ophthalmic Department overseas to start similar work in France. It took some weeks to secure ophthalmologists to fill the places thus vacated. Work in the first and second sections was carried on without interruption; but research work was greatly reduced for a time. By the latter part of November twenty ophthalmologists were in training or at work at the laboratory.

The Research work in the first period consisted in trying out all the functions of the eye under conditions simulating high altitude, to see which were most vulnerable. Visual acuity, light sense, color sense, visual fields, stereoscopic vision, fields of binocular fixation, power of convergence and divergence, besides reaction time experiments of special types, were the chief lines of work.

During the second period it was planned to do some more intensive studies of certain fields which seemed to promise results bearing on practical aviation.

Captain Cobb was assigned the problem of light sense; and has designed and constructed an adaptometer for accurate work in this field.

Captain Howard was assigned the problem of estimating distance and speed, which seem to play so important a part in making landings, whereby far the largest percentage of accidents occurs.

Captain Wheeler was given the tachistoscope, as modified by Ferree, for work on problems of accommodation and adjustment, from the point of view of the time required.

Captain Dow was given the problem of constructing some improved clinical tests for light sense, in coöperation with Captain Cobb, and determining their practical value.

Major Sherman and Major Lancaster have planned a joint investigation to determine the magnitude of errors likely to result in estimating hypermetropia without cycloplegia.

A number of other problems have been considered, such as some examinations of color-blind aviators under conditions of flight, with a view to determining how great a loss of color vision is necessary to be of practical importance in the different

kinds of flying,—moving-picture photographs of landings taken from the air-ship, with a view to analyzing some of the problems involved in making landings.

A careful study of the effects of smoking was also planned; but the University at which he was working could not spare the worker whom we selected for this investigation.

A reel of moving pictures was shown, illustrating some of the work at the laboratory, especially in the departments of Ophthalmology and Otology.

By Dr. ELLICE M. ALGER, Secretary.

MONDAY EVENING, JANUARY 20, 1919. DR. ARNOLD KNAPP, CHAIRMAN.

Dr. Kaufman Schlivek presented a patient with the diagnosis of a **tumor in the pituitary region,** showing with it the X-ray plates. For the past four years the child, a girl of eight years, had complained of severe headaches, sometimes as often as twice a week, and often accompanied by vomiting. Three years ago the left eye became prominent and a year ago was discovered to be blind. The family history was negative. The child was small but well nourished and mentally bright. Careful examination, both general and neurological, revealed nothing of importance. Both eyes were prominent, the measurement with the exophthalmometer being 19*mm* in the right and 24*mm* in the left. The vision in the right was $\frac{20}{100}$ and in the left there was no light perception. The pupils were equal, the right reacting to light normally, and the left very slightly, but with a good consensual reflex. The left eye was divergent and on a lower level than the right, and its motion upward and in adduction was restricted. The right fundus showed a simple optic atrophy with slight pigment changes about the nerve head. The left nerve head was white, with ill defined margin, marked vascularization, and a filled-in appearance. The nerve head and surrounding retina were elevated 1.5 D. The right eye had a temporal hemianopsia. Urine and Wassermann were negative. The X-ray examination, made by Dr. Dixon, showed in the sagittal plate what appeared to be an enlargement of the right optic foramen to 8.5*mm*, and of the left to 10*mm*. The lateral plate showed a very large sella, the least

anteroposterior diameter being 17.5*mm*, and the depth 11*mm* which at that age was very large. The square planimeter content was 158*mm*. The general contour and pushing back of the posterior clinoids gave undoubted evidence of a pituitary tumor, and from the invasion of the left orbit it was probably a sarcoma.

Dr. DIXON stated that the case was sent to him as one of orbital tumor. The patient was exposed in such a manner as to throw out the orbit of the opposite side, that is, the ray was directed from about the parietal boss downward and forward through the center of the suspected orbit. This resulted in a peculiar shadow, which was apparently attached to the parietal bone within the cranial cavity and in relation to the left orbit, nothing apparently appearing within the orbit itself.

The sagittal view showed large openings in the base of the lesser wing of the sphenoid, which could only be explained by erosion of the optic foramina, these foramina rarely, if ever, appearing on a plate exposed in this particular plane.

The information obtained from these plates being insufficient to make a diagnosis, the patient was asked to return, when additional plates were exposed at varying angles. This resulted in obtaining exactly the same appearances in the sagittal view, and the lateral view showed a very marked pathological condition of the sella turcica, which gave the clue to the diagnosis.

He spoke of a case of sarcoma of the pituitary body in an adult, examined a year or so before, where the appearance, so far as the sella was concerned, corresponded to the present case. The patient died soon after, and it was reported that a large sarcoma of the pituitary body was found at autopsy.

He was of the opinion that so much erosion could only be accounted for by a malignant growth in the nature of a sarcoma; further that it was possible that the tumor, in addition to entering the left orbit, may also have traveled forward within the cranial cavity to the frontal bone.

Dr. WILLIAM M. SWEET of Philadelphia opened the subject of the evening, **substitute operations for excision of the eyeball,** with a paper on the **implantation of a gold ball.** (Dr. Sweet's paper appears on page 257.)

Dr. A. N. ALLING of New Haven, read a short paper on **the implantation of fat.** (This paper appears on page 263.)

Captain HARVEY HOWARD of Boston, read a paper describing **the implantation of a glass ball,** after a technique developed by Dr. Verhoeff. (This paper appears on page 265.)

Mr. PIERRE GOUGELMANN discussed the subject **from the standpoint of the artificial eye maker,** in a paper which appears on page 268.

In the general discussion which followed Dr. JOHN E. WEEKS presented a patient on whom he had recently performed the **Mules operation,** which is applicable in cases in which the eye is not the seat of inflammation, suppuration, or a neoplasm, and is not in a condition of atrophy.

After freeing the conjunctiva and the subconjunctival tissues from the globe throughout the zone from the corneal margin to the insertion of the recti muscles, the cornea is excised by its inclusion in a fusiform flap, the long axis being in the vertical meridian. Every vestige of the uveal layer, as well as the other contents of the globe, must be removed. The opening in the sclera is lengthened by incisions 3½*mm* long, extending from the angles of the fusiform opening in order to permit the margins of the sclera to overlap when the sutures are introduced. Six or seven catgut sutures are used to close the opening in the sclera. The sutures are made to pass through the sclera from the external surface 2½*mm* from the margin on one side, and to emerge from the lower surface of the sclera on the opposite side *2mm* from the margin. The sutures are interrupted. After the catgut sutures are in position, but not tied, they are parted in the middle of the ellipse, and the glass or gold ball, which has been sterilized, is introduced (the Mules repositor facilitates this maneuver). The ball should be small enough to avoid any tension whatever on the line of sutures (9 to 12*mm* in diameter). The sutures are now tied, beginning with the central sutures. As the margins of the sclera are approximated, the *2mm* margin is slipped beneath the 2½ *mm* margin and an overlapping contact secured. This ensures a board surface for adhesion. All the sutures are treated in like manner. The conjunctiva and subconjunctival tissues are then sutured in a horizontal meridian by means of silk sutures. This method of suturing

the sclera and overlying tissues gives a firm union and makes it practically impossible for the artificial vitreous body to escape.

Dr. BEN WITT KEY presented two patients on whom he had performed **fat implantations,** after his own technique, which may be summarized as follows:

The conjunctiva is dissected well back behind the transitional fold. Each muscle is picked up with strabismus forceps, divided, and then is sutured just behind the forceps to the transitional conjunctiva, by fine chromicized catgut sutures through both edges. A twisted silk purse string suture is inserted in the conjunctiva, after which the globe is delivered in the usual way. After bleeding has ceased, Tenon's capsule is filled full of fat from the thigh, in one piece, after which the purse string suture is tied, and both eyes kept bandaged for four or five days. The result is that the muscles, becoming attached to the transitional conjunctiva, make their traction from the side of the fatty stump which projects between them, instead of from its summit, thus copying the natural method of insertion, securing a better seat for an artificial eye, and allowing a more natural rotation.

Dr. ROBERT G. REESE thought that cosmetic failures were more often due to sinking in of the tarso-orbital fold than to lack of motility of the prothesis. To avoid this he was very careful to avoid cutting the lateral invaginations and aimed to cut conjunctiva and capsule in one mass, making his original incisions between the lateral muscles and the inferior rectus. Recently he had used with much satisfaction an operation, not original with him, in which he removed not only the cornea and uveal tract but also the optic nerve and adjacent sclera, thus leaving a cuff of sclera with the muscles attached and all the dangerous areas removed. He also reported a case of Mules operation in which the glass ball broke after fourteen years' wear and was successfully replaced by paraffin. He remembered an eye containing a glass ball which had to be enucleated after some years, in which laboratory examination revealed a ring of bone encircling the nerve entrance. Dr. DIXON also remembered this case, the ball being apparently eroded.

Dr. WILSON had been very much pleased with his Mules

operations. He had recently seen one done over twenty years ago and completely successful so far.

Dr. J. H. OHLY was not enthusiastic over the Mules operation. He had seen a number of cases in which the balls came out sooner or later. Fat implantations had not impressed him as being much better in the end than other operations. The sometimes tedious waiting for hemorrhage to stop before implantation was possible had led him to use the snare in enucleations, as well as in eviscerations of the orbit.

Dr. C. B. MEDING thought the one factor of uncertainty in all implantations was the varying action of tissues following any surgical attack. Orbital shrinkage varied greatly not only in amount but in the various dimensions and no one could foretell it certainly.

Dr. C. C. BOYLE presented a boy of eight years whose eye had been injured by the explosion of a glass bottle. He had done an evisceration of the eyeball, and then inserted into the empty sclera a piece of sterile sponge, of quite fine texture, virtually performing a Mules operation with the substitution of the sponge for the solid sphere. The operation was done three weeks ago and was so far satisfactory.

Dr. KNAPP presented a patient upon whom a **fat implantation** after enucleation was performed eight months ago. The cosmetic result is excellent and the motility good. In his experience fat implantation gives a satisfactory cosmetic result. In performing the operation it is necessary to use a considerable amount of fat in order to fully distend Tenon's capsule and to produce an overeffect. This allows for the shrinkage which takes place to an unequal degree after the operation. It is not necessary to separately suture the muscles. They should be detached with caution, and as they slip back they are caught in the little openings through which they pass in Tenon's capsule and which become their subsequent insertions. Tenon's capsule is carefully sutured with catgut, making a vertical scar. The conjunctiva is then sutured horizontally with silk. In the after-treatment a small opening sometimes occurs and gives trouble from the protruding fat. This fat should be excised, particularly if it seems necrotic, when it appears a dirty gray; viable fat is pink and contains blood-vessels. In a case which was operated

on 2½ years ago the exophthalmometer showed on the operated side 15, while the other eye was 14, adduction *2mm*, abduction *3mm*, movement upward 1.

MONDAY EVENING, FEBRUARY 17, 1919. DR. ARNOLD KNAPP, CHAIRMAN.

Dr. CHARLES H. SCHLICHTER presented for discussion a patient with **congenital dislocation of both lenses and very poor vision.** F. M., aged 16, a schoolboy, was brought to his clinic because of poor vision. He had reached the seventh grammar grade but without the aid of glasses but the teachers and the school nurses have noticed that he seemed to have great difficulty with both near and distance vision. Examination showed V. O. D. $\frac{15}{200}$, V. O. S. $\frac{7}{200}$, which could not be improved. The iris was tremulous and a dislocation of the lenses diagnosed. The pupils were then dilated with atropin and a bilateral outward dislocation of the lens made out. The edge of the lens bisected the pupillary space. This is evidently congenital since his parents say that the boy never had good vision. The mother and father and other children of family have apparently normal eyes.

Dr. WALTER LAMBERT said that he had reported six such cases which he had treated very successfully by discission. The facility of the operation and the feeling of resistance in the subluxated lenses had surprised and impressed him very much. He was heartily in favor of the procedure in such cases.

Dr. ERVIN TÖRÖK presented a patient with **sarcoma of the ciliary body.** The patient, a woman 40 years of age, noticed six months ago that the sight in her right eye was failing. The eye was free from inflammation and there was an iridodialysis above, and the upper portion of the iris corresponding to this iridodialysis was atrophic, at the same time being pushed forward toward the cornea. A black tumor protruded from under the iris into the pupillary area covering about half of the pupil. Vision of the eye was $\frac{20}{200}$ with normal pupil and $\frac{10}{10}$ with dilated pupil. The tumor cannot be transilluminated.

Dr. S. A. AGATSTON presented a patient with **retinitis punctata albescens,** a girl of 19 complaining of temporary

difficulty in seeing when coming out of a bright light into a room; this indistinctness lasting only a few seconds. The vision was $\frac{20}{70}$ in each eye, not improved by lenses. The fields were normal for white and colors, even in reduced light. The media were clear but the fundi uniformly studded with small white spots resembling verrucæ laminæ vitræ. There were no cases of blindness or of night blindness in the family. The Wassermann was negative.

Dr. J. E. WEEKS thought the patient showed better than most the characteristic fundus changes. One of his own patients had had almost normal vision.

Dr. H. H. TYSON said he had reported two cases in which the Wassermann was positive.

Dr. ERVIN TÖRÖK read the paper of the evening on **tuberculin in the diagnosis and treatment of eye diseases** (published in this issue, p. 242).

DISCUSSION: Dr. JAMES A. MILLER had always rather envied the ophthalmologist his opportunity to study tuberculosis where it could be watched and the effects of treatment observed. He had used tuberculin for fifteen years and considered it no longer as a specific but as a very useful agent. Its dangers in diagnostic doses could be avoided by care and he had never had any bad effects, while the dangers from its therapeutic use depend almost entirely on the judgment of the physician. The two conflicting theories were (1) the plan of giving very small doses, not enough to produce any anaphylactic reaction, and (2) the use of doses sufficient to stimulate this reaction as evidenced, for instance, by the opsonic index, though this had not proved accurate enough in practice, and clinical observation was the best guide. The protein substance of the bacillus, which is the active principle, is found in all the preparations of tuberculin, and he had found it advantageous sometimes to change from one to the other. He no longer used as large doses as formerly because severe reactions were harmful, though they were sometimes followed by remarkable improvement. The dose should be graduated by the severity of the focal reaction, giving enough for the individual case and keeping near to his limit of tolerance. The intracutaneous method had proved a good guide though it required close supervision. In pulmonary tuberculosis at least, the chief

value of tuberculin was not so much in its immediate effects as in the added safety and permanence it secured.

Dr. EDWARD R. BALDWIN, of Saranac, stated in a letter that his experience with tuberculin in eye diseases was unfortunately limited. The medical men in the sanitorium had lost more or less interest in tuberculin treatment and had gone from tuberculin to other lines of interest. It should not be thought, however, that this was due to a lack of belief in the value of it in a certain number of patients. In one case of recurring retinal hemorrhages interrupted tuberculin treatment had been carried out for at least five years. The patient himself pinned great faith on tuberculin and had now been going for long times without any recurrence of the retinal hemorrhages.

Dr. LAWRASON BROWN of Saranac wrote that from a very limited experience with tuberculin in the eye, he was impressed with the fact that patients all do particularly well with this form of treatment.

Dr. ELLIS BONIME said there seemed to be some uncertainty as to the kind of tuberculin to use. Of course they were all alike in action. However, O. T. (old tuberculin) was easier to handle at the beginning of treatment as it did not produce as severe a reaction as B. E. (bacillary emulsion). Occasionally, where a patient seemed to resist the action of tuberculin, and months of treatment to have produced no appreciable result, or in a case where tuberculin constantly produced reactions no matter how one reduced the dose, a change in the form of tuberculin would sometimes clear the atmosphere and bring about the desired effect.

Secondly, the convert to tuberculin therapy was usually puzzled by the lack of uniformity in quantity expression of dosage. Milligram, minim, cubic centimeter, have been the quantity designations by different users. This has been discouraging to many. The minim was too large and, unless far greater dilutions were used, necessitated too great an increase from dose to dose. The cubic centimeter answered every purpose. All tuberculin was in fluid form and by using the *cc* we can always know how much of the original product (which is sold in *cc* quantity) was administered. The milligram dose did not apply to O. T. and required the

knowledge of the amount of solid substance per cubic centimeter in order to really realize the quantity administered.

Thirdly, as to the conclusion of treatment, it was most important to know when to stop tuberculin. If stopped too soon a recurrence has been found to take place in most cases. After years of experience he found that sufficient tuberculin had been administered when 0.20 *cc* of the pure O. T. was reached. This should be followed by 10 to 30 inoculations with B. E. beginning with 10% solution and increasing rapidly until 0.10 or 0.30 of a *cc* pure O. T. was reached, depending upon the chronicity of the tubercular process. So much for the conclusion of the course of treatment, but he particularly emphasized the fact that a series of tests 3 months apart over a period of two years was necessary in order to make sure that we had gone far enough even with the above inoculations to prevent a recurrence. Experience has shown that a recurrence of susceptibility was a forerunner of a recurrence of the disease and by controlling this with a course of tuberculin we can in many instances get ahead of any recurrence of the disease.

Dr. H. R. MILLER said that tuberculin was not an antibody in the strictest sense of the word; and therefore not a true specific. It possessed, however, curative properties and this manifested itself in acting through the focus of disease in actively immunizing the body. It was obvious, therefore, that for tuberculin to be potent there must be present a focus of tuberculous disease, and that a so-called cure depended upon the response for cure produced in this focus of disease. It was also a fact that the tuberculous body can be made more and more tolerant to ever-increasing amounts of tuberculin; this being in some sense an immunizing process. The basis for tuberculin therapy then depended upon these two factors: namely, (1) that it worked through the lesion already present; (2) that it may be tolerated in increasing amounts by the subject; and our aim was to so increase the tolerance of the tuberculous body to enlarging doses of tuberculin as to render harmless the toxins liberated in the focus of tuberculosis.

Several theories have been advanced to explain the action of tuberculin, the one most generally accepted being the theory of hypersusceptibility. It has been claimed that the

tuberculous body possesses an altered capacity to react to freshly introduced tubercle bacilli; in other words, to reinfection, and similarly, that the tuberculous host possesses the same altered capacity for reaction to tuberculin. This has been spoken of as "allergy."

For the ophthalmologist it was significant to realize that he was dealing with a circumscribed, so-called, attenuated tubercular lesion, and that it was, therefore, possible for him by the use of tuberculin to call forth healing responses already present in the patient without running any marked danger of producing constitutional or undesired systemic effects.

Dr. J. G. DWYER said he would discuss the subject from both the laboratory and clinical standpoint. From the laboratory side we must remember that the exact way in which the tubercle bacillus acts is unknown and the nature of tuberculin is unknown in its real essence. The opsonic content mentioned by Dr. A. Miller is of very little if any importance in the immunity against this organism as very often the patient's opsonic count is above normal and the lesions still progress. Again we must remember that the body infected with tuberculosis manufactures its own tuberculin and we only aim to increase the amount of this in suitable cases. From the clinical standpoint there are several very important practical points to be kept in mind and the speaker would quote from his experience of about ten years as to the essential points always to be kept in mind. In the first place the cutaneous reaction has only a very limited field of service and a positive cutaneous reaction is of diagnostic significance only in a patient who is not old enough to have suffered from any form of tuberculosis and to have recovered from it—hence it is of value in young children only. A negative cutaneous or von Pirquet is of far more significance, as an evidence of the absence of tuberculosis, past or present. The test of choice is the subcutaneous and in order to employ this it must be done under the proper conditions or it is useless. It should be done always under direct medical supervision and, as pointed out, the local focal and general reaction must be watched for and properly interpreted.

The kind of tuberculin does not matter—the important thing is for the physician to have an intelligent appreciation

of the underlying principles of tuberculin therapy, its limitations especially, and until this fact is understood, harm will result from its unsuitable application. The type of case and the dosage is of far more importance than the kind of tuberculin.

Tuberculin is one of the best therapeutic agents that we have when suitably applied and one of the worst when used in unsuitable cases and unsuitable dosage.

Dr. WEEKS. In my experience the presence of tuberculosis of considerable extent in other parts of the body appears to retard recovery in the tubercular affection of the eye. I have had one case of rather extensive lung tuberculosis which was not very active, but the lesions of which were very evident in the X-ray plates of the lungs, in which the tuberculosis of the eyes (both corneæ and adjacent scleræ were affected) was influenced extremely slowly by the tuberculin. I have also one case of tubercular double irido-chorio-sclero-keratitis accompanied by tubercular ankylosis of a knee joint, in which the treatment with tuberculin has affected the eyes extremely slowly. However, the condition is surely approaching inactivity. It has appeared to me that in advanced adult life the response to the use of tuberculin is not so rapid as it is in children and young adults.

What are the reasons of failure? A number of cases of tuberculosis of the eye have come under my care in which tuberculin has been used with alternate improvement and relapse, and some in which the condition, although suspected to be tuberculosis, has been pronounced non-tubercular after a prolonged use of tuberculin. In my experience the chief source of failure is neglect of regularity in administering tuberculin where a reliable preparation has been used, and in other cases due to the failure to use a reliable tuberculin. In regard to the first, it is absolutely necessary that the tuberculin be used regularly and efficiently until the tuberculous process is at an end. If the tuberculin is used in a haphazard way the tubercle bacilli will not be destroyed but will grow in the interval of neglect, and the result will be only an intermittent inhibition. In the second place, the tuberculin used must be determined to be efficient, as shown by its effect on the patient. If improvement does not continue a different form of tuberculin

should be used until one is found that will produce improvement.

The essentials of success are (*a*) regularity in the use of tuberculin until the process ceases to show any signs of activity, and for a period of some months afterward; (*b*) the use of a tuberculin that is up to the standard strength, in sufficient dose to influence the system just short of a general reaction.

In regard to the tuberculins to be employed, any of the standard tuberculins may be efficient. In their use it has been my custom to inject them into the loose subscapular areolar tissue, sterilizing the skin with alcohol or tincture of iodine, and sealing the puncture with collodion. I have no doubt that equally good results will be obtained if the tuberculin is injected into subcutaneous loose areolar tissue in any part of the body.

Dr. COLEMAN W. CUTLER presented a patient with a **conglomerate tubercle of the choroid,** a man of 34 years, whose left eye had been failing for three months. His general health was good and the various tests, including Wassermann, were negative. The appearance of the mass covering the macular region of the left eye was that of a subretinal tumor, grayish white, without appearance of stroma, rising abruptly to an elevation of 4 to 5 D. In size about double the diameter of the nerve head vertically and horizontally. The retinal vessels crossed over it unbroken. There was much œdema between it and the nerve, and upwards especially, where the vessels were in places covered by whitish flocculent masses. When first seen, there were no hemorrhages. Tuberculin was begun October 25th with 4 min. of the first dilution of B. E. (Mulford), and cautiously increased. There seemed to be occasional increase of œdema with small hemorrhages and a surrounding ring resembling circinate retinitis, at some distance from the tumor itself, became more evident. The doses were increased with little change until on February 11th, when he was last seen, the tumor was sharply circumscribed, about 4 D. elevation, no hemorrhages or reactionary œdema.

This case was undoubtedly one of solitary tubercle. The tumor has not been notably reduced in size by the use of tuberculin, although the surrounding œdema and irregular deposits in the retina have diminished. Cases are reported which

without treatment have diminished in size and undergone cicatricial changes. In fact it is the rule in isolated tubercular choroiditis, which we see not infrequently, for the deposit to undergo retrogressive changes and run its course, leaving an atrophic spot, without treatment with tuberculin but with due regard to the hygiene and general health of the patient. This, of course, is analogous to the healing of tubercular foci in the lungs and elsewhere under favorable conditions of life and should make us somewhat guarded in the claims that we make for the favorable action of tuberculin, which have been made with such confidence, often justifiable, in ocular lesions of the most varied sort.

Dr. Cutler wished to state briefly his opinion that: 1. No case should be subjected to the massive diagnostic injection without a very careful physical examination, if necessary with radiographs of the chest before the test and afterwards, especially if there is a reaction. Dr. Miller's statement that he has seen no ill effects from tuberculin is certainly most reassuring. 2. In most cases of corneal and iris tuberculosis in children, which form by far the greatest number of the patients, it has not seemed necessary to use large diagnostic doses at all. If syphilis is excluded, the diagnosis is not difficult in most cases, and usually the improvement after a few weeks of the B. E. is conclusive. There are exceptions to this rule, but it should be borne in mind that in *diagnosis* violent reactions are not necessary, and may be dangerous, and that the physical signs should be watched with the utmost care, and that in *treatment* reactions are detrimental and the best effects are obtained by small doses of tuberculin with gradual increase, omitting a treatment or reducing the quantity when the slightest sign of hyperæmia appears.

In one case, a child of 8, with marginal and central corneal opacities, of the familiar deep phlyctenular type, and with considerable vascularization, was given tuberculin beginning with 2 min., which was gradually increased to 8 min., when she had a severe reaction during which the corneal condition became very much worse, the ulcers larger, the vessels more numerous. With this there was much swelling of the accessory lacrimal glands, slight swelling of the parotid, none of the submaxillary, quite suggestive of Miculicz' disease. Temperature

rose abruptly to 104° F. The recession was gradual. Tuberculin was resumed after the eye had become pale and the condition about as at first. Again, after the tuberculin had reached about the same strength, a reaction was produced, not as violent as the first and without swelling of the accessory lacrimal glands. She has received no tuberculin since. There was no obvious improvement in the corneal lesion, which showed a tendency to advance towards the pupillary area, which has been controlled by cauterization and calomel. This child is evidently so sensitive to tuberculin that its use would be dangerous. She is fat and well nourished, ruddy, and apparently normal.

Another girl, of about 14, with corneal and iris lesions which are chronic, showing no signs of vascularization, with a large cervical gland, has received increasing doses of tuberculin for several months and has now commenced with the third series without any signs of reaction and with very striking improvement in her general condition. The size of the gland has diminished one half, the iris nodule has disappeared and the cornea is much clearer, with entire absence of photophobia.

These cases, which present many interesting features that cannot be given in detail here, show the necessity for individualizing in both diagnosis and treatment.

Dr. A. E. DAVIS said there were one or two points he would like to emphasize.

First, as regards diagnosis, in all cases where the etiology was in doubt, the tuberculin tests should be used routinely, just as the Wassermann test is. His practice was invariably to make the von Pirquet test in adults as well as in children. If this very delicate test proved negative, it eliminated at once one etiologic factor, tuberculosis; if the test was positive, or partially positive, the subcutaneous injection of O. T. should be given, the first dose being one half *mg.;* if this proved negative, then two *mg.*, and in the event this proved negative, five *mg.* If no reaction was obtained, then again, tuberculosis was excluded. He was somewhat surprised that the von Pirquet test was not more widely used in adults, being a very simple test to make, and if negative, definitely excluding tuberculosis as a factor. If positive, of course, it must be supplemented by the O. T. injections. Second, as

to treatment. He used the H. K. Mulford serial dilutions altogether, the B. E. and O. T. mixtures. Formerly, he used the B. E. mixture almost exclusively, for therapeutic purposes, but lately had gone to the use of O. T. preparation. He began with the smallest dose (2 min.) of the weakest (No. 1) dilution, and increased 2 min. a dose, until the maximum dose (20 min.) of the No. 1 dilution was given, or until he got a mild reaction. If this reaction was not obtained with No. 1 dilution, then he used No. 2 dilution, beginning with 2 min. and increasing as with No. 1 dilution, and so on through dilutions Nos. 3 and 4, until a reaction was secured. This was indicated by a mild rise of temperature, one half to one degree, a slight redness at the site of the injection, and perhaps a mild focal reaction in the eyes. We should be exceedingly careful, however, how we stirred up focal reactions in the eye. He believed in getting mild reactions, however, because he did not understand how those who do not believe in getting reactions ever know when they are up to the physiological dose of the vaccine. He thought reactions were necessary, first, as a guide as to the physiological tolerance of the patient, and, second, to secure the full effect of the remedy.

REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SECTION OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. H. DICKINSON, London.

An ordinary meeting of the Section was held on Wednesday February 5th, under the presidency of Mr. W. T. Holmes Spicer, M.B.

Mr. A. C. Hudson showed a patient who had **retinal degeneration** following the presence of an intraocular foreign body. The appearance presented was that of folds in the internal limiting membrane of the retina, probably, the author thought, as a result of contusion of the eye. Some of the lines could be seen to pass in front of certain of the retinal arteries: they also seemed to have a faint stippled appearance. Those were his reasons for placing the location in the internal limiting membrane, rather than regarding them as folds in the retina itself. He thought the lines indicated a pathological condition, and that the optic disk presented signs of having been œdematous. He had seen similar appearances in a case of retinitis pigmentosa, the folds there having occurred as a result of traction in the retina: also in a case of contusion of the whole of the macula, the retina in that case appearing to be absent except the portion which was represented by the double-contour line. He regarded these appearances as exactly analogous to the peculiar double lines one could see in some posterior capsules after cataract extraction: they were also analogous to the striæ seen in the cornea in striate keratitis following injury in the cornea, again due to the folding of a thin elastic membrane—Descemet's.

Mr. J. Herbert Fisher said that in support of the exhibi-

tor's idea that they were a new formation was the fact that the patient was definitely blind in his remaining eye for a considerable time after he was hit. That suggested some definite lesion, probably in the fundus oculi, and as there was chemosis on the anterior part of the globe, the central œdema was perhaps considerable. With regard to the evidence of past œdema in the head of the optic nerve, the retraction of the nerve was 3 to 4 diopters, and the congested appearance might not be due to recent change.

Mr. A. W. ORMOND thought the amount of swelling was much greater in the upper than in the lower part of the disk, and he regarded the condition as pathological. He had seen a like appearance in a case of injury on one side of the head, and looked upon it as due to the force of the blow.

Lieut.-Colonel DONALD ARMOUR and Mr. WILLIAM LANG showed a patient from whom an ivory exostosis of the orbit had been removed by Colonel Armour through the cranium. The patient attended at the Royal London Ophthalmic Hospital, where the staff decided it was a case for a general surgeon. Colonel Armour admitted him into Queen Square Nerve Hospital, and operated. After studying the skiagram, he decided that the best procedure was to make an osteoplastic flap and turn it over the frontal region, its base being at the supraorbital margin. He turned down bone and scalp together. That displayed the cranial portion of the tumor, which was indenting the under surface of the frontal lobe. By pushing the dura and brain gently back over the summit of the tumor, he could see the whole extent of its cranial portion. The tumor seemed to be fixed to the supraorbital margin, but it proved not to be so, and could be levered away. Part of the removal was accomplished with chisel and hammer, and where the roof of the orbit was implicated, removal was effected piecemeal by cutting forceps. Complete recovery ensued, vision was now normal, there was neither diplopia nor fundus change, and, except for the scar, nothing remained to show that an operation had been done. Judging by the covering of mucous membrane at one portion, it must have been growing from the frontal sinus. There was no evidence that the operator had broken into the frontal sinus, but on the day following the operation, and on the succeeding day

or two, there was an escape of blood from the nostrils, but the sinus was apparently aseptic, as nothing further happened.

Colonel Armour was heartily congratulated.

Mr. J. F. CUNNINGHAM exhibited a case of **cartilaginous tumor of the orbit,** which Colonel Armour recommended operation for.

Mr. ELMORE BREWERTON showed a case of **angioma of the retina.** He referred to previous cases of the kind which had been exhibited and said he regarded this one as a cavernous angioma. The disease seemed to reside in the oval swelling in the periphery. These cases were, nearly always, in young adults or children, and they might be of congenital origin. There seemed to be congenital faulty development of the capillaries in that part of the retina, these capillaries dilating into cavernous spaces, resulting in an oval limited area of angioma. The rest he regarded as merely mechanical in causation. In proof of that view was the fact that branches coming off were normal in size and general appearance. This was the lad's only eye, and Mr. Brewerton did not regard the prognosis as good: he feared leakage, and already there was slight exudation at one spot. He would probably have an intraocular hemorrhage, which might clear up, but a second such accident would deprive him of his sight. At six years of age, the other eye was removed as it was not only blind but painful.

Mr. A. W. ORMOND regarded these cases as very interesting because of the relationship to the other eye. He had a similar case in a soldier, who at 5 years of age had an eye removed for what was considered to be a growth, but which turned out not to be so. The condition seemed akin to what Coats described as massive exudation of the retina.

Dr. JAMES TAYLOR read a communication entitled **changes in the sella turcica in association with Leber's atrophy.** The object of the paper was to exhibit skiagrams of the pituitary fossa in a well marked case, and to support the thesis advanced by Herbert Fisher as to the connection of this disease with sexual abnormalities. The chief changes seen skiagraphically were in the posterior and anterior clinoid processes.

The PRESIDENT considered that this paper took the profession a step further on the subject: it would be a great com-

fort if the origin of Leber's disease could be definitely known. It was scarcely to be expected that the only abnormality in connection with it was in the sella turcica. The series of observations made by Ogilvie years ago on the large number of deaths of children in families afflicted with Leber's atrophy seemed to point the direction which future investigations should take.

Mr. J. HERBERT FISHER referred to his paper in which he first made the suggestion that Leber's optic atrophy was probably due to implication of visual pathways by the pituitary body when that gland was undergoing excessive physiological changes in association with sexual development or decline. Since he published his paper, he had had a remarkable case in a woman who prematurely reached the climacteric at 37 years of age, and a year or two afterwards her vision failed, with the characteristic changes in the disks, and definite changes in the sella turcica were seen in the skiagram. There seemed no reason why sporadic cases, apart from family tendency, should not be found, answering the same cause. In such families there was, usually, a high infantile mortality, which seemed to point to some syphilitic taint. The pituitary was a body essential to the continuance of life: if extirpated, the animal died. Hence disorder of the pituitary body seemed consistent with early death.

Dr. W. WALLACE (late Captain) showed, by means of the epidiascope, a remarkable series of his drawings in water-color of fundus changes resulting from war injuries. He was highly commended for them, and offered to present his whole collection of drawings, the result of many years' work, to the profession.

Professor HERBERT PARSONS hoped the drawings would be made the nucleus of an ophthalmological atlas to commemorate the work done in the specialty during the war.

Mr. FOSTER MOORE read a paper on a case of **sympathetic ophthalmitis with fundus changes.** The patient had a puncturing wound of the right eye, with prolapse of iris and ciliary body. The prolapse was removed, and, a fortnight later, the eye was enucleated. Twenty days after removal of the eye, its fellow started to be a little misty. There was, soon after, some tenderness of the eye on palpation, and a fine deep

haze in the lower part of the cornea. The veins were somewhat distended, but the fundus was normal. The blood count was normal. A skiagram negatived the idea of a foreign body being in the eye, and Wassermann was negative. Keratitis punctata spots appeared: five doses of neo-salvarsan were given. At one time vision fell to $\frac{6}{60}$. He did not think the neo-salvarsan had any influence on the disease, and he quoted the conclusion of a special Committee of the Ophthalmological Society, some years ago, that mercurial inunctions had "no decidedly bad effect" on sympathetic ophthalmitis.

Mr. FRANK JULER, who made the drawings of the case, added the results of his observations.

OXFORD OPHTHALMOLOGICAL CONGRESS

Master, SYDNEY STEPHENSON.
Deputy Master, CAPTAIN PHILIP H. ADAMS, R.A.M.C. (T).
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Hon. Secretary, BERNARD CRIDLAND, Salisbury House, Wolverhampton.
Past Master, THE LATE ROBERT W. DOYNE.

March, 1919.

PRELIMINARY NOTICE

DEAR SIR:

The Oxford Ophthalmological Congress will assemble at Keble College, Oxford, on the evening of **Wednesday, July 9th, next,** and the Meeting will be held on **Thursday, the 10th,** and **Friday, the 11th July.**

The first day, Thursday, the 10th, will be largely devoted to a discussion on "PREVENTIVE OPHTHALMOLOGY," to be opened by Colonel J. Herbert Parsons, A.M.S., Consulting Ophthalmic Surgeon to the Forces.

Members intending to take part in the Discussion are requested to kindly send in their names to the Hon. Secretary at their early convenience.

The second day, Friday, the 11th, will be given up to papers, demonstrations, and cases, etc.

It is hoped that members will make every effort to contribute to the success of the Meeting with cases, specimens, new operations, or novelties of any kind. If, therefore, you have any such that you are willing to bring forward will you kindly notify the undersigned at the earliest opportunity and your contribution will be welcomed.

The Annual General Meeting will be held in the evening of Thursday, July 10th.

Yours faithfully,

BERNARD CRIDLAND,
Hon. Secretary.

Salisbury House,
Wolverhampton.